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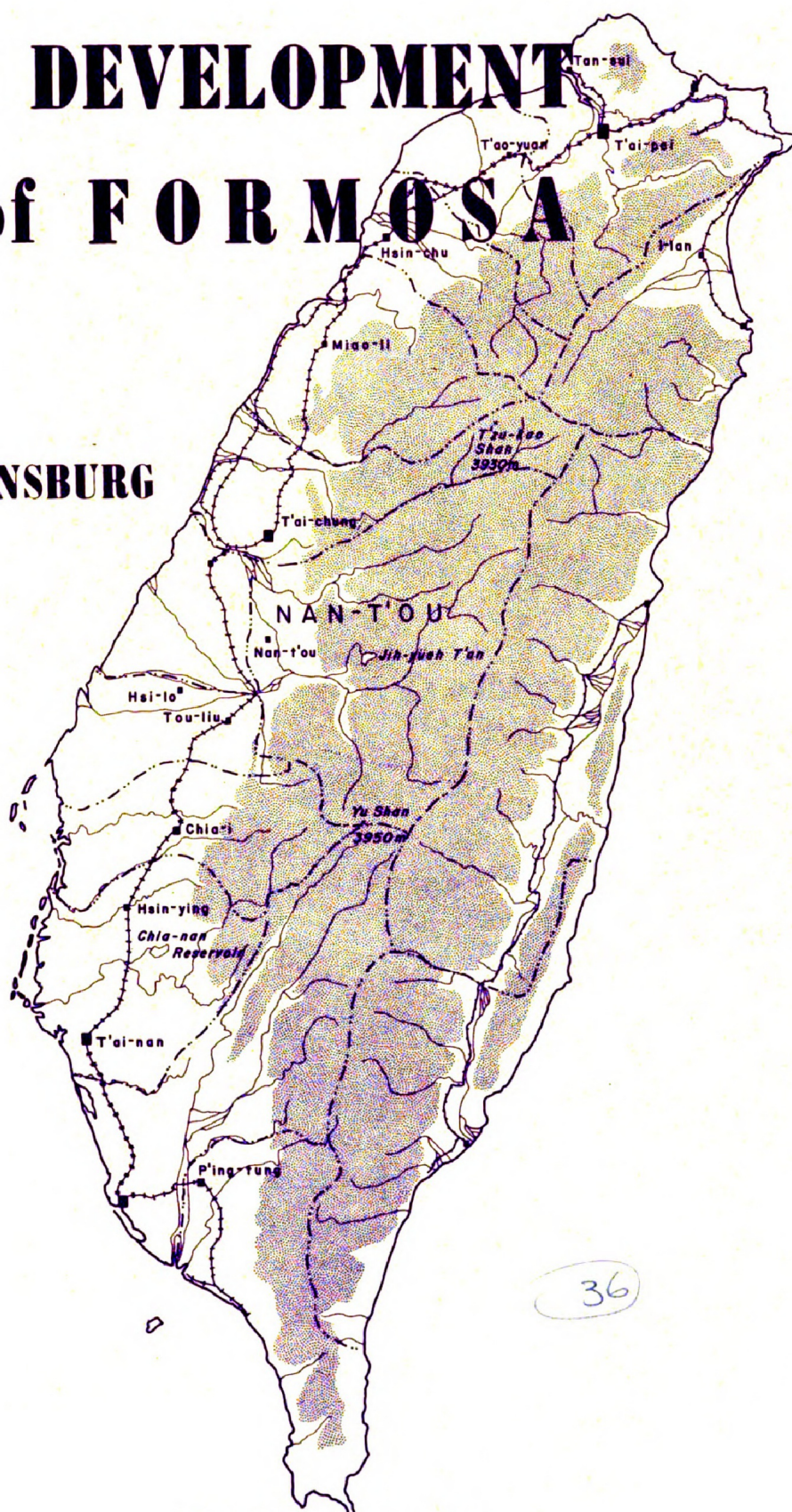
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ECONOMIC RESOURCES

and DEVELOPMENT of FORMOSA

NORTON S. GINSBURG



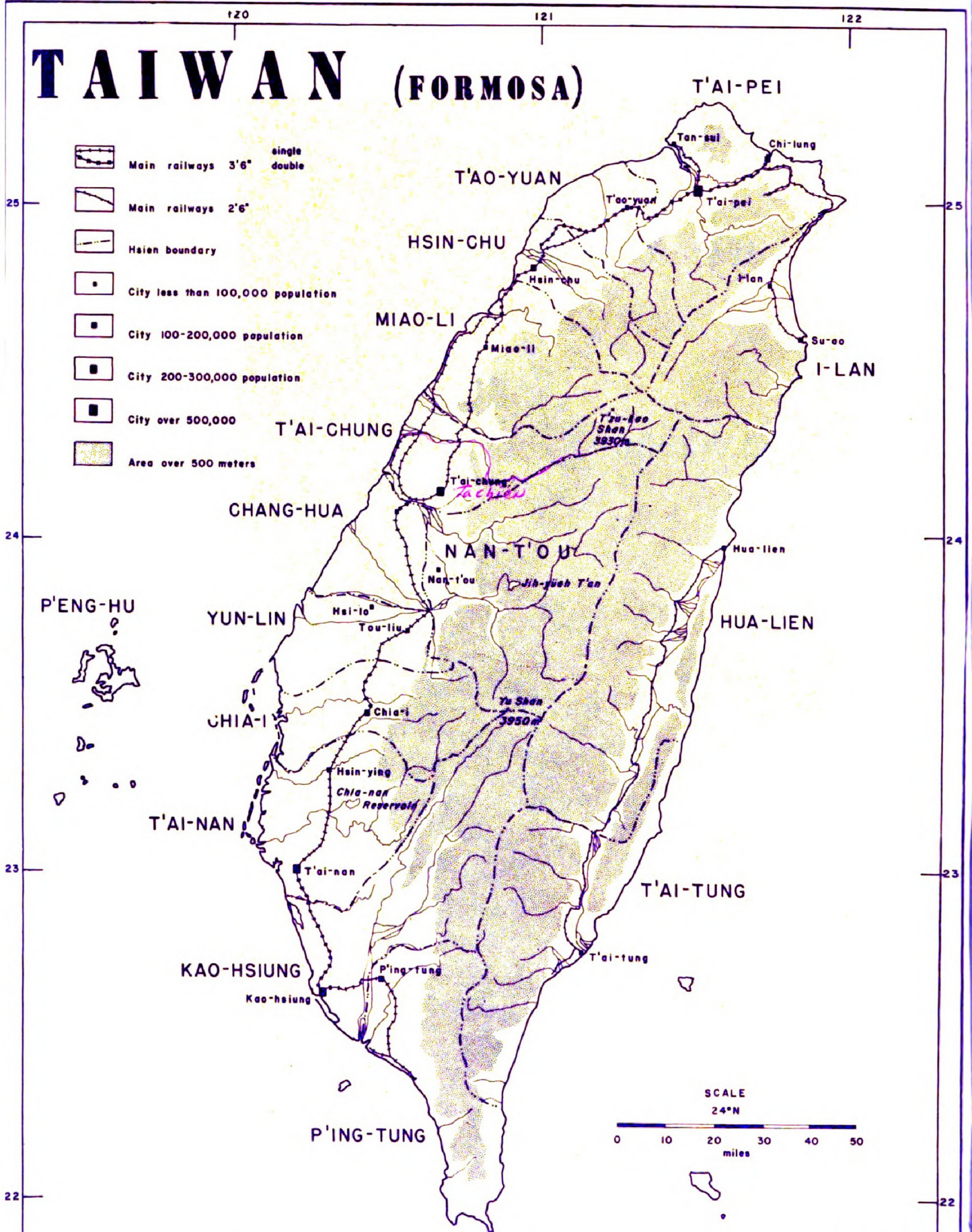
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TAIWAN (FORMOSA)

-  Main railways 3'6" single
-  Main railways 2'6" double
-  Hsien boundary
-  City less than 100,000 population
-  City 100-200,000 population
-  City 200-300,000 population
-  City over 500,000
-  Area over 500 meters



P'ENG-HU

YUN-LIN

CHIA-I

T'AI-NAN

KAO-HSIUNG

P'ING-TUNG

T'AI-PEI

T'AO-YUAN

HSIN-CHU

MIAO-LI

T'AI-CHUNG

CHANG-HUA

NAN-T'OU

HUA-LIEN

T'AI-TUNG

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The Economic Resources and Development Of Formosa

by

Norton S. Ginsburg

Department of Geography, University of Chicago

International Secretariat
INSTITUTE OF PACIFIC RELATIONS
1 East 54th St., New York 22, N.Y.

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FOREWORD

This report is one of several studies being prepared for the Institute of Pacific Relations on various aspects of economic development and the improvements of living standards in Asian countries. Others dealing with India, Pakistan and Ceylon will be issued later.

Formosa provides a particularly interesting case of Asian economic development under vigorous outside stimulus, whether under the Japanese colonial system or under the special American aid program of recent years. The differences between the two phases are great but the points of resemblance deserve more attention than they have usually received by writers and officials. They will warrant increasingly close study in the future as Japan's economic revival begins to exert its natural power of attraction upon the foreign trade and internal economy of Formosa.

No introductory paper like this can expect to provide conclusive answers to the larger questions which confront any student of Formosa's economic future. Those answers are too much bound up with political and strategic factors affecting several other countries besides Nationalist China to permit conclusions to be drawn from economic analysis alone. It would be equally impossible to determine from the limited available information what parts of the programs for economic development and agricultural reform tried out in Formosa have been mainly dependent on American advice, encouragement, technical skill and finance and what parts reflect changed attitudes, new policies and new skills of the Nationalist Government officials and the Taiwanese people. Still less can one predict how far the projects and methods used in Formosa during recent years could be successfully applied to the different circumstances of other under-developed areas in Southern and Eastern Asia.

Nevertheless it seems almost certain that this unique Formosa experiment will provide some important lessons in the value and limitations of accelerated economic development and reform programs and also some useful points of comparison with economic development programs in other parts of Asia such as the Philippines, Ceylon, Burma, and in the vastly more complex task of reconstruction and reform which must be tackled in Korea.

The present study serves to supplement the earlier, more general I.P.R. book, Formosa Under Chinese Nationalist Rule, by Fred W. Riggs. Though it is issued under the auspices of the I.P.R. International Secretariat, it should be noted that the author alone is responsible for opinions expressed in the report.

New York
August 12, 1953

WILLIAM L. HOLLAND
Secretary General

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In addition to the independent activities of its National Councils, the Institute organizes private international conferences every two or three years. Such conferences have been held at Honolulu (1925 & 1927), Kyoto (1929), Shanghai (1931), Banff, Canada (1933), Yosemite Park, California (1936), Virginia Beach, Virginia (1939), Mont Tremblant, Quebec (1942), Hot Springs, Virginia (1945), Stratford, England (1947), and Lucknow, India (1950). The Institute conducts an extensive program of research on the political, economic and social problems of the Pacific area and the Far East. It also publishes the proceedings of its conferences, a quarterly journal, Pacific Affairs, and a large number of scholarly books embodying the results of its studies.

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ERRATA

- p. 3, last para., line 7, "meridianal" should read "meridional".
- p. 4, line 1, "is a true plain" should be omitted.
- p. 10, first para., line 6, "(1938)" should read "(1939)".
- p. 11, last para., 3rd line from bottom, "deepend" should read "deepen".
- p. 15, last para., lines 16 and 17, "bogasse" should read "bagasse".
- p. 17, first para., line 3, "2.776 metric tons" should read "2,776 metric tons".
- p. 17, second para., line 3, "565,000 metric tons in 1939" should read "465,000 metric tons in 1943".
- p. 20, third para., line 1, "Taiwanese" should read "Taiwan".
- p. 21, fourth para., line 3, "70 millions" should read "90 millions".
- p. 41, first para., lines 11 and 12, "with those farmers, especially in the controlled irrigation areas of the southwest for their can crops" should read "with farmers, especially those in the controlled irrigation areas of the southwest, for their cane crops."
- p. 45, line 6, "say in fertilizers" should read "with primary emphasis on fertilizers".

THE ECONOMIC RESOURCES AND DEVELOPMENT OF TAIWAN

INTRODUCTION

Taiwan (Formosa) is in many ways a fortunate case-history or experiment for those who are concerned with the problem of economic development, particularly as it applies to Asian societies. Here is an island, separated from what had been its parent body politic before the war (Japan) and more recently removed from its post-war political affiliation (China Proper) by the consequences of the Chinese Communist revolution. It stands, then, to a considerable extent, dependent upon its own resources for survival in an increasingly hostile Far Eastern milieu. However, it also has become the object of concern for the United States, as well as other nations in the non-Communist world. As part of this concern the United States is now assisting not only in the military strengthening of the island but also in the development of its resources and in the reorganization of its economy so as to maximize its ability to stand as a major outpost against Asian Communism. At the same time, Taiwan possesses major elements in common with other nations and regions in Asia, and the lessons gained from developmental experiences there might well be applied in modified form elsewhere in Asia. Taiwan has been a colony of a Westernized Asian power and also illustrates many of the attributes of an agrarian Oriental society. Yet it possesses characteristics and problems of its own which make it a unique case study of the still mysterious process of economic development.

It is one of the assumptions of this paper that the nature of the resource base in a given region and the pattern of its utilization influence every phase of the developmental process. For this reason most of the emphasis herein is upon resource development problems, past and present. The paper is divided rather arbitrarily into four parts. The first and longest is concerned with the nature and utilization of agricultural resources. The second concerns industrial resources and their developmental trends. The third and fourth sections deal primarily with the developmental process as applied under the Japanese and with the present programs for development now being implemented by the Nationalist Government and by the American governmental agencies, such as the Mutual Security Agency, which are assisting in the formulation and implementation of developmental policy. It is assumed that the course of development under Japanese rule may provide lessons which might be applied to the solution of present problems, although many of the external circumstances have changed radically.

The fact that the island has become an outpost against Communism and is also the seat of a National Government with no control over mainland China, has given rise to many special difficulties in connection with development. It means that the island must support not only one government, a provincial government, but a national government as well. It means that a military establishment has to be maintained, largely on the basis of the island's productivity. It means also that one of the natural trading areas, the Chinese mainland, has become inaccessible. It means lastly that a large refugee population, poorly fitted into the economy as a whole, and therefore substantially underemployed, must be supported.

A brief examination of the population situation is a prerequisite to an understanding of the developmental problem. There are various estimates given for the size of population in Taiwan. The latest figures given by the local authorities indicate a population of 7.8 million in 1951, exclusive of the military establishment estimated at 600,000 men. Although no accurate census has been taken since 1940, estimates from other sources range higher than 10 millions of which about 1.5 millions are native Formosans. An MSA estimate for the end of 1951 gives a total of 9.2 millions, ^{1/} and indeed by the end of 1952 this might well have increased to over 9.5 millions.

The significance of these figures is all the more apparent when considered in the light of the population supported by the island in the recent past. In 1905, the date of the first reliable census, there were 3.16 million people on the island, very largely the descendants of migrants from the southeast coast of China and predominantly Fukienese and Hakkas, each group speaking a Chinese dialect of its own. By 1939 the total population had risen to 5.9 millions, of which native Formosans numbered over 5.5 millions. The last published Japanese statistics, in 1943, gave a population of 6.59 millions of which the native population, including some 160,000 aborigines, numbered something over 6 millions. Thus, the native population of the island had about doubled in 38 years as death rates had moved downward. At the present time the total population has increased by almost half since 1943, aided by a very substantial immigration. More important, however, is the fact that the death rate has continued to decline, to an estimated 10 per 1,000 in 1951, as compared with 19.8 per 1,000 in 1939; but the birth rate at 44 per 1,000 is approximately the same as it was in 1939. ^{2/} Thus, the annual natural rate of increase is now 3.4 per cent. At this rate, the population will double in 21 years. In exaggerated form, this illustrates a problem that is facing or will face many of the Oriental countries as their economies develop and living standards rise. It underlies any consideration of the economic development of the so-called "underdeveloped" regions. The problem of population control cannot be considered here, but it will be assumed that the rate of economic development must be greater than that of population increase, if there is to be any per capita economic gain.

^{1/} N. Wycoff, "An Outline of Demographic Conditions and Prospects on Taiwan," Chinese-American Economic Cooperation, May 1952, p. 43.

^{2/} On the basis of a population of 9.2 millions, the population density is 667 per square mile, as compared with 586 in Japan, 165 in the Philippines, and 51 in the United States. The "nutritional density", that is, the population per square mile of cultivated land, is 2,777, as compared with 3,534 in Japan, 2,200 in Belgium, and 188 in the United States. Wycoff, op. cit., pp. 44-45.

I. AGRICULTURAL RESOURCES AND DEVELOPMENT

From the first Taiwan had been developed by the Japanese as a major source of foodstuffs, chiefly rice and sugar, to feed the rapidly growing population of Japan. The foodstuffs surpluses from the island were sizeable; rice exports accounted for about a third of all prewar imports of rice into Japan, while sugar exports provided Japan with all of her needs. It is not strange, therefore, that Taiwan came to be regarded in Japanese as well as in the world's eyes as a land of great surplus, a jewel of plenty in a Sino-Japanese world of subsistence agriculture and chronic food shortages. Even today articles and reports appear from a great variety of sources in which Formosa is described as a "treasure island," a "rich island," "a paradise." 3/ It has been described also as the richest area in the Far East. This view implicitly assumes that there is something about the resources of the island that makes it superior in its developmental possibilities to neighbouring regions. Nothing could be further from the truth. What Taiwan has had is the benefit of a long period of Japanese rule during which intensive agricultural development took place on a base which was as yet only partly developed and upon which lived a relatively sparse population as compared with similar areas across the Straits of Taiwan. It was in other words, at the time of the Japanese occupation a "frontier" area. At the present time, its "frontier" qualities have disappeared, and the amount of arable land not already in cultivation appears to be inconsequential.

The elimination of the frontier and the rapid increases in population have created a problem similar to that faced in many other parts of the Orient. Certainly, in terms of occupations Taiwan is a predominantly agricultural region. In the prewar period a total of about 75 per cent of the gainfully employed were directly or indirectly dependent on agriculture for livelihood. About 60 per cent of the population were actually engaged in farming and a substantial percentage were engaged in the processing of agricultural products, chiefly sugar and rice. In 1951, out of a probable native population of 7.3 millions, a little under 4.2 million persons or 57.5 per cent 4/ were classified as agricultural. Both before and after the war the bulk of Taiwan's exports also were classified as agricultural; in 1936 about 90 per cent by value were foodstuffs. In 1951, although the total amount of exports had declined greatly, the percentage of foodstuffs remained about the same as before.

The Geographical Basis for Agriculture

The surface configuration of Taiwan, an island of about 35,961 square kilometers, one-fourth the area of Illinois, is determined by the easterly location of a major mountain chain which runs NNE-SSW along the axis of the island. The island itself is a tilted fault-block, characterized by a gentle sloping to the west and an abrupt dropping off to the east. The bulk of the area topographically suitable for agriculture lies in the western half. In the east, only the narrow meridional rift valley, extending roughly between Hua-lien in the north and T'ai-tung in the south is agriculturally significant. Not all of the western plain is topographically suitable for agriculture, however. Intermittent spurs and outliers of the mountains rise above the plain and break it into units of irregular size. Only a relatively narrow strip within a few miles of the Straits of Taiwan is a true plain formed of the coalescing alluvial fans of the west-

flowing rivers, (is a true plain.) Here slopes are gentle enough to eliminate the need for major terracing and fear of rapid soil erosion. Thus, it is not strange that only 24 per cent of the land surface is under cultivation. This figure compares favorably with Japan's 16 per cent and southeast China's estimated 14 per cent, but unfavorably with France's 46 per cent and the percentages of many other western European countries.

There are explanations other than topographic, however, for the relatively low percentage of arable land. Soils are of variable fertility throughout the island. Many have been leached of their inherent fertility through centuries of irrigation and a millenium of constant rainfall. Those in the north are primarily old leached alluvials and diluvials and some are residual over acidic volcanic materials. Some are characterized by poor drainage conditions which the high and evenly spread northern rainfall makes difficult to rectify. In the southwest, where the greatest concentration of agricultural productivity is found, most of the usable soils are red and yellow lateritics demanding careful management and derived from gravelly and sandy alluvial fan materials, some of which are too shot with unweathered materials to be fertile. Over large areas, of course, the alluvial soils are inherently fertile, but here again long periods of intensive cultivation and irrigation have resulted in a leaching of plant nutrients. Upland soils are in most cases thin, immature, and infertile. Also, the western plain is crossed by mile-wide bands of sand, gravel, and boulder detritus, dropped as the short swift-flowing streams debouch from the mountains onto the relatively level plain. In sum, all of the soils of Taiwan demand intensive fertilization in order to counter an infertility which has resulted either from intensive monocultural practices or has existed from the first. Such soils problems as these, however, are not dissimilar in kind to those in Japan and southern China as well as parts of Southeast Asia.

Taiwan's major agricultural advantage is derived from a sub-tropical climate characterized by moderate to high annual temperatures and, except in the highest uplands, a year-round growing season which permits the cultivation of at least two, and sometimes more, crops per year on a given piece of land. Temperature variations are extreme, however, due to differences in relief, since 42 per cent of the island lies at altitudes over 500 meters. Temperature differences from north to south are less than might be expected from a latitudinal range of 250 miles, since the island's coasts are laved by the warm Kuro Shio which runs northeastward toward Japan and operates much like the Gulf Stream in ameliorating climatic conditions. But even so, effective temperatures, vary considerably with the changes in wind direction associated with the monsoons of eastern Asia, and in the north with excessive cloudiness. 5/

Although all of the island receives 40 inches of rainfall a year, except for a very narrow strip along the west coast, precipitation is seasonally and locally variable. Most of it falls between May and September, except in the northeast where 80-100 inches is fairly well distributed throughout the year. Here the prevailing winds are northerly and northeasterly and bring rain to T'ai-pei and I-lan hsien. In the west and southwest, however, it is dry to very dry in the winters, since the northeasterly winds which bring rain to the northeast are stripped of their moisture by the interceding mountain barrier, and the northerly

winds run too close to the grain of the country to be lifted high enough to cause extensive precipitation. Almost all of the southwestern littoral is subject to droughts of 50 days or more every two years. 6/

In the summer months the winds reverse and come prevailing from the south and southwest. These summer winds are moisture-bearing, but blow irregularly since the temperature differentials between the warm seas and the land over which they pass are low. Much of the summer rainfall, then, is convectional and irregular for that reason. During the spring and early summer months the northern areas come under the same stagnating low pressure systems which cause the "bai-u" of Japan and spring drizzles of Shanghai. 7/ They are the only considerable parts of the island having both summer and winter rainfall, but with penalties of cloudiness and high humidities that make the relatively cool northern winters dismally chilling.

Agricultural Land Utilization and Methods

The chief characteristic of the agricultural landscape in Taiwan is slope. In few places are there great stretches of level land where slope is inconspicuous, although locally, as in the T'ai-pei Basin, near-level areas are to be found. In the southwest most of the cultivated land is on the gently sloping alluvial fans which coalesce to form the plain. In the mountains regular and irregular patches of cleared forest land are seen on slopes as steep as 45 degrees. From the air, the western agricultural landscape appears as an infinitely varied mosaic of green, red-brown, and grey patches, with the flooded paddy fields reflecting the sky and climbing the lower slopes of the rounded outcrops which rise from the broken but regularly sloping plain. This is in contrast to the wet-rice landscapes of the lower Ganges Plain in India or of the floodplain of the Menam Chao Phaya in Thailand, which stretch nearly level for scores of miles.

In Taiwan fields almost everywhere are terraced -- some very gently on the alluvial fans and the valley bottoms of the north, some more conspicuously on higher slopes and in the mountains. Dry crops, also may be found terraced -- upland rice, bananas, tea, sweet potatoes, wheat, vegetables, and maize -- but most are not, and the indiscriminate and unterraced cultivation of steep mountain slopes is one of Taiwan's major soil conservation problems. 8/

One major exception to the terracing generalization is the sugar estate, where sufficiently large areas of level land, frequently on diluvial interfluvies, have been placed in sugar cultivation so as to eliminate the need for terracing. However, on the smaller sugar holdings, which are operated by peasant cultivators and produced more than two-thirds of the pre-war cane for the sugar centrals on a contract basis, terracing is more the rule than the exception.

The terracing of steeper slopes indicates that the land most suitable for wet-rice cultivation, and indeed agriculture in general, has been occupied and placed in production. In 1905, the year the Japanese completed their first land survey, the amount of cultivated land was given as 628,000 hectares. 9/ In 1939 the figure was 859,000; in 1951 it was 873,870. 10/ The little land now being placed under cultivation is mostly marginal. Essentially, there is no arable land not already under

cultivation. The two eastern hsien, T'ai-tung and Hua-lien, account for only 5 per cent of the total cultivated area; T'ai-pei and I-lan hsien in the northeast for about ten per cent. The bulk of the remainder is found in the hsien which occupy the western plain. At present 61 per cent of the cultivated area, or 534,000 hectares, is paddy land.

As in most of the Far East, the average farm unit is privately, not publicly, owned and is small. As of early 1951 the government owned some 182,000 hectares of arable land of which 60 per cent was non-paddy land. ^{11/} The Taiwan Sugar Corporation, a government enterprise which took over the confiscated assets of the Japanese sugar companies, owned 120,000 hectares in early 1952. The average farm unit, occupied by 6.4 persons, is approximately 1.32 hectares, as it was before the war, although this figure includes lands owned and cultivated by the sugar company. A more meaningful figure shows that in 1939 72 per cent of the farm families cultivated farms less than 2 hectares in size and over 46 per cent operated farms of less than 1 hectare. ^{12/} The amount of arable land available per capita of the Formosan population is estimated to be 0.12 hectares; that available for the total population is 0.095 hectares.

In general, fragmentation of fields is not as serious a problem in Taiwan as it is elsewhere in the Orient. It is more common in the south, where a village settlement pattern is characteristic, and less common in the north where scattered isolated farmsteads are more typical. ^{13/} In any case, the relatively recent settlement of the island and the expanding agricultural frontier, until about twenty years ago, provide sufficient explanation for the relative consolidation of landholding units. The need for irrigation, however, by a predominantly wet-rice agriculture under conditions of wide-spread slope have made for the division of each farm into several small "bunded" fields, the number depending on the degree of slope and the degree of water control available.

Irrigation, is, of course, typical of wet-rice agriculture and, indeed, in the broadest sense is practiced throughout the Orient not only in rice cultivation but also in wheat growing, as in the North China plain and in the Upper Ganges plain. However, there are important distinctions between various kinds of irrigation. Most statistics concerning irrigated land refer to controlled irrigation, that is, the cases where the sources of water are subject to direct control and manipulation. In general, there are two kinds of controlled irrigation, the one characterized by major damworks and the application of modern technology, the other characterized by less elaborate engineering works, often constructed with non-Western techniques and depending more on animal or human than mechanical energy for distributing water to the fields. A third kind refers simply to the flooding of fields by overflowing rivers and a fourth to the type where natural rainfall is impounded in fields surrounded by bunding (low retaining walls of earth) and underlain by a sub-surface hardpan.

In Taiwan, the first type is exemplified by the Chia-nan irrigation system in T'ai-nan hsien which covers 150,000 hectares and accounts for 28 per cent of the total paddy area of 533,800 hectares. ^{14/} It was constructed as a government project under the Japanese primarily to develop sugar cane production. The second category is found all over the island and accounts for perhaps 55 per cent of the paddy area. Control of these irrigation areas most often is vested in the local water utilization associations. The third category is not significant in Taiwan. The fourth,

however, is of considerable significance, amounting to some 90,000 hectares. 15/ This primitive kind of "natural" irrigation is most common in the upland heavily terraced areas and also in the north where rainfall is abundant the year round and large storage basins are unnecessary. However, ponds are also most common in the north, not only as an emergency source of water in case of unusual drought, but also as a source of rich bottom mud for use as fertilizer and as the home of water fowl and fish to augment the traditionally low-protein diet of the farmer. In the southwest, where ponds are perhaps most needed, the sparse rainfall makes them relatively uncommon.

In addition to terracing and irrigation, a third characteristic of Formosan agriculture is multiple-cropping, a practice encouraged by the paucity of arable land and made possible by the long growing season. The percentage of cultivated land cropped in 1951 is officially reported to have been 160 per cent, about the same as it was during the pre-war period. The highest cropping index is in what had been T'ai-chung hsien; the lowest in the present Hsu-lien hsien. Thirty-eight per cent of the cultivated land consists of double-cropped paddy fields which produce two crops of rice a year and occasionally a supplementary crop of vegetables as well. In some areas a green manure crop will be raised between the first and second rice crops. These double-cropped paddy fields are almost all watered under controlled irrigation conditions. Many of the so-called "single-cropped" fields, however, actually produce one crop of rice plus an auxiliary crop of other grains or vegetables. Many of the dry fields also produce more than one crop, especially where water during the winter season is available.

Intertillage also is practiced widely. On the lands devoted to both sugar cane and rice, the cane may be planted between the rows of ripening grain, and vegetables may be planted in this fashion on paddy fields that have been drained shortly before the harvest. Because much secondary produce is used in the household and is grown on single fields often widely spaced, it is not always reported in the government's agricultural statistics. For all of these reasons, it is safe to assume that the multiple-cropping index given above understates reality.

On the other hand, the differential between the 160 per cent figure and the real figure is probably not very great. 16/ Therefore, the emphasis in so much of the popular literature on the fact that several crops can be produced from a given piece of land in Taiwan is misleading. Apparently, the multiple-cropping index is not much higher than that in the lower Yangtze basin and, indeed, may be lower than that in certain sections of southern Kwangtung province in China. 17/ The fact that the index is as low as it is, though it certainly is high by any Western standards, may be explained by the lack of water during the dry season and by both a lack of soil fertility and unavailability of fertilizers especially on the dry fields, which amount to about 40 per cent of the total cultivated area. 18/ Also, fields in which sugar cane and rice rotate have a substantially lower cropping index, although they may be almost constantly under cultivation, largely because of the growth span of sugar cane, which on the island is about 18 months.

The use of given pieces of land for more than one crop each year and the continuous maintenance or increase of productivity demanded of Formosan soils has depended upon the use of large quantities of fertilizers. As is the custom in most of the Orient, the greatest quantity of fertilizers comes

from domestic farm sources. The total amount of all fertilizer materials in the form of composts, green manures, night soil, straw, and ash comes to over 13 million metric tons each year. The combination of composts and night soils comes to about 8 million metric tons, despite wasteful conditions associated with composting. This is the equivalent roughly of 80,000 tons of ammonium sulphate, 40,000 tons of calcium superphosphate, and 56,000 tons of potassium sulphate. 19/ Before the war, only small quantities of commercial fertilizers were produced on the island, and about 600,000 tons were imported, of which about 150,000 tons consisted of soy bean cake from Manchuria. In 1952 some 450,000 metric tons of commercial fertilizers were distributed for all purposes. Almost all of this quantity consisted of mineral fertilizers of which about 362,000 tons were allocated to rice, 20/ the balance going to other crops, chiefly sugar cane. Very little bean cake was used, since the high price of bean cake has channelled its use in the direction of animal feed rather than fertilizer. 21/ About 330,000 tons of fertilizer, about half of which was ammonium sulphate, were imported, chiefly from Japan. 22/ During the war, and shortly before, the Japanese, with considerable success, encouraged the use of green-manure crops as a means for supplementing declining supplies of commercial fertilizer. Since the war, however, the use of green manures has declined greatly, although the amount of commercial chemical fertilizer available in 1952 after a near-disastrous drop, is said to have nearly approximated in effectiveness the maximum amounts used under Japanese rule. 23/

Considerable quantities of fertilizers are supplied by the animals which play an important role in the Formosan farm economy. An estimated 2.35 million metric tons of animal manures were available in 1951. Hog manure, especially, returns a large percentage of fertilizing elements to the soil. Tests on hogs fed with soy-bean cake indicate that 60-70 per cent of the nitrogen and phosphoric acid and 40-50 per cent of the potassium are found in the manure. 24/ Thus, the use of available bean cake as animal feed rather than fertilizer can be justified on this ground.

Hogs also are the major source of fresh meat for the population. In 1939 the hog population was about 1.66 million; in 1939 it had declined to 577,000; in 1948 it had risen to 1.16; and in 1951 it reached the remarkable figure of 2.26 millions. In 1951 the number of hogs slaughtered (1.17 millions) was double that of 1949 and considerably higher than that of 1943, although the weight of hogs slaughtered per capita was only 9 kilograms as compared with 13 in 1939, because of the great increase in human population. 25/

Motive power in agriculture apart from humans depends primarily on cattle, 75 per cent of which are carabao (water buffalo), the remainder being native yellow cattle intermixed with Indian humped cattle. During the war the total number of cattle had decreased from 324,000 in 1939 to 280,000 in 1946, a major decline but less proportionately than that of hogs. By the end of 1951 the cattle population had increased to 394,000, although the slaughter rate has just reached the prewar total and remains far below the prewar per capita averages. The water buffalo are used primarily as work animals in the fields; the other cattle are more commonly employed on the roads although they also are used in the fields. Both contribute to the meat supply, but to only seven per cent of the extent of hogs.

Agricultural Animal and Fish Production

The close of the war and the occupation of Taiwan by the Chinese Nationalist Government brought temporary disaster to the elaborate agricultural structure built up under Japanese rule. The system of agricultural organization and supervision, supported by an estimated 20,000 technicians, collapsed. At the same time supplies of commercial fertilizers and bean cake had been cut off, irrigation facilities deteriorated further, distribution facilities and markets faded away, and the island's economy tended to revert to the nearly self-contained state in which it had been before Japan took over. In recent years, however, there has been a gradual rebuilding of the productive capacity of Taiwanese agriculture. Certain crops already have exceeded the best output of the prewar period; others are approaching those levels; others are yet far below. In all cases, but in varying degree, productivity per unit area is below that of the immediately prewar period.

As before the war, rice, sugar cane, and sweet potatoes are the big three agricultural crops, together accounting for about sixty per cent of all agricultural production in 1951, including livestock products. In that year, rice accounted for just 50 per cent of the total value of all crop production. Lesser crops of importance are citrus fruits, vegetables, tea, peanuts, tobacco, bananas, and pineapples. 26/ Rice and sweet potatoes are distributed widely over the arable areas in most of the hsien, rice occupying the better soils in the valley bottoms and along the lower slopes, sweet potatoes occupying poorer sandy or gravelly soils and being more common in the upland areas. In many areas sweet potatoes are a catch crop between plantings of rice or rice and sugar cane. Sugar cane, however, is restricted primarily to the southwestern part of the island, although some varieties are grown for local unprocessed consumption elsewhere. Tea is concentrated primarily in the northern foothills; bananas are raised throughout most of the agricultural areas, but commercial production tends to concentrate along the margins of the western foothills and outliers. Pineapples are concentrated in two major nodes, the slope lands in T'ai-chung and Chang-hua hsien and in Kao-hsiung hsien, with a lesser node in eastern T'ai-nan hsien. 27/

The increase in agricultural production especially since 1947 is well exemplified in the case of rice, the output of which is beginning to approximate that of the prewar period. 28/ In 1938, the year of maximum production, output was 1.40 million metric tons of brown rice. In 1951, output had exceeded this figure at 1.48 million metric tons and estimates for 1952 indicate an output of well over 1.5 million tons. The area cropped to rice, however, in 1951 was 789,000 hectares, whereas in 1938, it was only 625,000. This indicates a decline in yields from 2.24 metric tons per hectare in 1938 to 1.88 in 1951, although the latter figure is a substantial improvement over the 1947 figure of 1.47 metric tons. Although there is more than one explanation for this lowered productivity, it appears that most of the decline is due to the postwar fertilizer shortage. In 1938 some 390,000 metric tons of commercial fertilizers were used on rice fields; in 1947 the amount was 77,000 tons and in 1951 it was 280,000 tons. In 1952 the commercial fertilizers distributed for rice amounted to 362,000 tons, or 29 per cent more than in 1951, but spread over a twenty per cent larger area than in 1938. As a consequence, it is believed that the per-hectare yields of rice may have reached 2.0 metric tons in 1952.

The same declines have been evident in sugar production, again due in part to the shortage of fertilizer, but here there also has been a very substantial reduction in the acreage of sugar cane, from 167,000 hectares in 1938, to 118,000 hectares in 1949, to 79,000 hectares in 1950-51. Sugar production has therefore understandably fallen seriously since the prewar period when 1.4 million tons were produced (1938) to 612,000 metric tons in 1950 and 350,000 tons in 1951. Planned output for 1952 was about 550,000 tons, but this level may not have been reached. Meanwhile, per hectare yields of cane have fallen from 65 tons in 1941-42 to 45 tons in 1950-51. 29/ The decline in sugar cane acreages is best explained by the competition between rice and cane for land in the southwest. The price of rice since the war, though rigidly regulated by the government, has in general been somewhat higher than that of cane. Furthermore, rice can be eaten by the consumer and stored for long periods of time; it also acts as an effective substitute for currency especially when the official currency is fluctuating in value. Also, when the farmer agrees to raise cane, he thereby commits himself to a course of action lasting almost a year and a half, whereas with rice he is much freer to change his cultivation pattern and to take advantage of price fluctuations. Under the Japanese, the farmer was induced by easy loans and coerced by threats of losing his irrigation water to raise cane, although the policy of the Japanese in this regard sometimes shifted. The first of these devices is gradually being implemented, the second, perhaps fortunately, apparently is not. In any event, the result has been a decline of sugar cane from some 17 per cent of the total value of agricultural production in 1938 to 11 per cent in 1951.

This situation with regard to sugar is complicated further by the relatively unfavorable climate and soils for cane in Taiwan. This is reflected in higher costs for Taiwan cane than for Hawaiian, Javan, or Cuban cane, although production per unit area per annum has been quite high, almost the same as that for Hawaiian cane. C. S. Ch'en has maintained that the maximum acreage for cane should be restricted to a maximum of 120,000 hectares (this on the now doubtful assumption that Formosa would be integrated into the economy of China as a whole, and that more favorable Chinese areas in southern Kwang-tung and on Hainan Island would be exploited further). 30/

The biggest increase in the production of any major crop has been that of sweet potatoes, from 1.7 million tons in 1938 to 2.2 millions in 1950. A dropping off occurred in 1951 to 2.02 million tons. The production increase reflects an expansion of area in sweet potatoes and disguises a decline in yields. Although accurate statistical information is not available, it appears that the difference between the 133,000 hectares in sweet potatoes in 1938 and the 232,000 in 1951 represents areas formerly occupied by other crops, probably sugar cane, possibly also bananas, pineapples, and tea. Some of it, however, represents land recently brought under cultivation, usually on slopes too steep for permanent agriculture.

Present governmental policy in Formosa seems to parallel closely that of the Japanese, who encouraged the substitution of sweet potatoes for rice on the part of the Taiwanese consumer, especially during the thirties after Korean supplies had become abundant. However, a very substantial part of the harvest goes into animal (especially pig) food, 31/ and the Taiwanese generally eats rice, the food he prefers in any case. Since, however, the sweet potato provides more calories per acre than does rice

(not assuming double-cropping for the moment) it must be regarded as an important replacement for rice in many overcrowded rice regions of the Orient. Already signs of this trend are apparent in the increasing acreages devoted to sweet potatoes throughout the East Indian archipelago, the Philippines, northern Vietnam, and southern China. The fact that in Taiwan, however, there has been a slight falling off of acreages in sweet potatoes, may indicate that production may level off at its present figure.

Among the lesser crops of note on the island, tea and pineapples are well below the pre-war output levels. Bananas, however, are approaching these levels, although the quality of the fruit is reportedly lower than before. Peanuts and wheat are two crops of which production and acreage have gone up substantially, and peanut oil now provides about a third of the edible oil needs of the island. Both may be considered the consequence of an influx of wheat-eating northern Chinese mainlanders, accustomed to using peanut oil in cooking, although the elimination of Manchuria as a source of soy beans has made some kind of substitution inevitable. Fruit and vegetable production is somewhat above pre-war levels, and jute also has reached the pre-war output figures. Other fiber crops are insignificant. Tobacco output is above that of the pre-war period, as is the acreage in tobacco, but yields are still somewhat below the pre-war level.

In addition to the limited sources of meat referred to previously, the islanders have another source of protein in the barnyard fowl found in association with every farmstead -- ducks, chickens, geese, and turkeys. The total poultry population is estimated to have been 9.7 millions at the end of 1951, of which over half were chickens. This means about one barnyard fowl for every person on the island. The possibilities for developing a high-grade poultry industry are considerable, but the problems of obtaining high-quality feed have thus far militated against its development.

A further source of protein comes from the waters surrounding and on the island. In 1939 almost a 100,000 metric tons of fish were taken from coastal and inshore fisheries and from fish culture ponds along the coast and in the interior. In 1951, after a serious decline which began immediately at the outbreak of the war, production reached approximately 105,000 tons. Of this total about 25,000 tons came from piscicultural enterprises. In other words, there was a bit more than 11 kilograms of fish per person available in that year. This can be compared with a pre-war estimate of 28 kilograms per person, but then the balance was composed largely of imports of cheap salt fish from Japan as part of a trade in which some of the better quality Taiwan fish, fresh or canned, moved to Japan. Most of the catch landed at Formosan ports come from the coastal waters within a few kilometers of the island, as well as about the Pescadores. Although there is a fleet of 1,500 motorized fishing craft, these total no more than 23,000 tons in all, as compared with 28,400 tons in 1942, and a large percentage of the total catch, especially from the shallow waters offshore is handled by sailing craft and the traditional bamboo raft which seems omnipresent along the coast. Most of the fishing activity is concentrated on the west side of the island where the gently sloping island shelf provides an accessible ground for demersal species. On the east coast where the seas deepen immediately outward from the shore, the waters of the Kuro Shio provide pelagic species such as tuna, bonito, and the like.

Fish breeding is a common practice in the paddy fields of the Orient, and in many regions special areas are set aside specifically for that purpose. In Taiwan the area devoted to fish breeding amounts to about 30,000 hectares, which in terms of land use makes fish the sixth-ranking crop on the island. 32/ Two kinds of fishponds are recognizable, those that are fresh and those that are salt. Formerly, the freshwater ponds occupied greater areas and produced more than the salt water ponds, but the latter are now far more important, producing almost 20,000 of the 25,000 tons of fish food harvested in 1951. In the salt water ponds, milkfish and oysters are most important; in the freshwater ponds, members of the carp family, as on the mainland and in Japan, are most common. In both cases the ponds are fertilized and literally cultivated before the fry, sometimes imported from the mainland or from Hongkong, are placed in them. The importance of pisciculture is shown by the fact that in 1951 the value of its production equalled that of tea and tobacco combined, and it is expanding.

Furthermore, the output of the marine products industry as a whole in 1951 had a value 25 per cent greater than that of sugar cane before processing. Yet, the bulk of Taiwan's fish today is consumed fresh. Wastage is high because of relatively few storage facilities at the ports, and processing consists for the most part of salting, drying, smoking, and boiling and smoking. The major fishing ports are Kao-hsiung and Chi-lung, with Su-ao, Ma-kung, Hua-lien, Tan-shui among the more important secondary ports. Marketing is handled primarily through the local Fisheries Associations which operate under government Auspices.

At the present time there is a relative abundance of food in Formosa despite the increase in gross population. There is a surplus of rice which now amounts to something over 150,000 metric tons of brown rice a year, a quantity considerably smaller than the pre-war period when, for example, in 1934 720,000 tons were exported. The first substantial exports from Taiwan, chiefly to Japan, took place in 1951 when 103,000 tons were exported.

That there is a food problem of a sort, however, is clear, although it is not as acute as that which afflicts Japan, for example, since per capita calorie and protein intake is low by Western standards and the prospects for raising it depend on the possibilities of obtaining the foreign exchange with which fertilizers and the like can be obtained. If Taiwan is to possess a stable economy, it must produce an export surplus of foodstuffs; if unrest in rural areas is to be avoided, economic stability is essential, and this means greater quantities of consumers' goods paid for directly or indirectly by agricultural exports. At the same time, this statement is in short-run terms. In the long run, say twenty and more years, it is doubtful whether the agricultural resource base as outlined above can be forced to produce enough to supply the needs of the rising population curve and at the same time provide substantial export surpluses. Other resources must be brought into play, and these must be adapted carefully to a changing society. Taiwan's current claim to be a "treasure island" in agricultural terms can scarcely be maintained in the face of these formidable problems.

FOOTNOTES TO CHAPTER I.

- 3/ See for example, T. H. Shen, "Food Production and Administration in Taiwan," Scientific Monthly, May 1952, p. 1.
- 4/ Taiwan Agricultural Yearbook, 1952, p. 37.
- 5/ The average number of cloudy days at Chi-lung (Kurun) is 215.4 per year; at T'ai-pei, 182.6; at T'ai-nan, however, only 96.5. See U. S. Navy, Civil Affairs Handbook, Taiwan (Washington, 1944), pp. 123-32.
- 6/ C. S. Ch'en, Atlas of Land Utilization in Taiwan (T'aipei, 1950), p. 5.
- 7/ T'ai-pei, for example, displays the same two rainfall maxima, one in late spring and one in late summer, as elsewhere in eastern Asia. The second maximum is associated with the occasional typhoons (average, six per year) which are most common between July and September. See C. S. Ch'en, "The Agro-Climatic of Formosa," Memoirs of the Faculty of Agriculture in National Taiwan University, Volume 2, No. 1, January 1948 (In Chinese with English summary).
- 8/ The debris-strewn flood plains of both the east and west coasts provide sufficient examples of the problem's scope. On the east coast at least one major power plant (at Tung-men) has been buried by a fifty-foot rise in the river bed. Silting of bottom lands on a smaller scale is commonplace.
- 9/ Y. Takakoshi. Japanese Rule in Formosa (London, 1907), p. 130.
- 10/ Taiwan Agricultural Yearbook, 1952, p. 14.
- 11/ Ibid. This arable land was taken over from Japanese government agencies, corporations, or individuals. In 1951 sales of government land amounted to a reported 21,700 hectares. See Chinese-American Economic Cooperation, February, 1952, p. 22.
- 12/ Taiwan Agricultural Yearbook, 1952, p. 23. Figures are given in chia, rather than hectares, but the difference is slight, one chia being equal to .97 hectares.
- 13/ Features of the Taiwanese settlement pattern are described in Tomita, Y., "Characteristic Features of the Formosan Settlements in Taiwan, Japan," Comptes Rendus du Congrès International de Géographie (Amsterdam, 1938).
- 14/ The paddy area is 61 per cent of the total cultivated area. For a detailed description of the Chia-nan area, see C. S. Ch'en, "Irrigation and Rotation in the Chia-nan Irrigation Area," Taiwan Sugar Industry Quarterly, Vol. 3, No. 2, March, 1950.
- 15/ The means by which this figure is reached are dubious. In the agricultural yearbook (for 1952) 493,000 hectares are classified as "irrigated," but of these some 50,000 hectares are listed as "dry fields" and "others", apparently referring to those areas within water utilization districts where controlled irrigation is not or cannot be practiced. When these are subtracted from the total, the resulting 440,000 hectares is assumed to be the controlled-irrigated area. The difference between this figure and the 534,000 hectares of paddy land noted elsewhere in

the yearbook is assumed to be a measure of the area under "natural" irrigation.

- 16/ An estimate of 181 per cent is made in R. N. Gleason, "Rice Production in Taiwan," Chinese-American Economic Cooperation, March 1952, p. 65. This may be high.
- 17/ J. L. Buck's index of double-cropping in the Yangtze Rice-Wheat region is 165; in the Double Cropping Rice Region, 176. Buck, Land Utilization in China.
- 18/ Also dry fields, especially those associated with shifting cultivation, are certainly understated.
- 19/ T. H. Shen, op. cit., pp. 261-2.
- 20/ Chinese-American Economic Cooperation, September, 1952, p. 94.
- 21/ The agricultural yearbook tends to overstate annual fertilizer consumption since it includes bean-cake in its totals.
- 22/ In 1951, some 262,000 metric tons were imported, of which 148,000 tons were ammonium sulphate.
- 23/ R. N. Gleason, op. cit., p. 72. The total effectiveness of all commercial fertilizers, however, can be expected to be less than the Japanese maximum due to the decline in the use of imported bean-cake. In 1938, 390,000 tons of chemical fertilizers were used on a rice area 20 per cent smaller than that of 1952.
- 24/ O. L. Dawson, Outline of an Agricultural Program for Taiwan (T'ai-pei, 1949), p. 25. Mimeographed report.
- 25/ Data from Taiwan Agricultural Yearbook, 1952.
- 26/ In 1951 these few crops accounted for 91 per cent of total crop value.
- 27/ Crop distributions are mapped in Ch'en, Atlas of Land Utilization in Taiwan. op. cit.
- 28/ Data chiefly from Gleason, op. cit., pp. 65 ff.
- 29/ Taiwan Agricultural Yearbook, 1952, p. 73. The low point was 1946-7, when 30,000 hectares were planted to cane and sugar production amounted only to 30,000 tons.
- 30/ C. S. Ch'en Land Utilization in Taiwan, (T'ai pei, 1950), p. 315. (in Chinese). Comparative cost figures for sugar production are not easily available, but in 1928 Javanese sugar was being quoted in Japan at eight yen per picul as against ten yen for Formosan. See M. Otaki, "Japan's Trade and the China Incident," Sugar, May, 1938, p. 43.
- 31/ T. H. Shen estimates that recently only "11 per cent of the sweet potatoes produced have been consumed for food." op. cit., p. 259.

32/ A useful discussion of pisciculture and the fishing industry in general is found in an unpublished manuscript of C. S. Ch'en, "Marine Products of Formosa."

II. RESOURCE BASE AND INDUSTRIAL DEVELOPMENT

Until twenty-five years ago the industrial potential and significance of Taiwan was a matter of little moment, and the non-agricultural industry of the island was largely indigenous and handicraft. Only when Japan had secured for itself a reliable, colonial source of foodstuffs to meet her food deficiencies were the industrial resources of the island given fuller consideration, and a limited program of industrialization (described below) initiated. Furthermore, non-agricultural resources known to exist on the island were few, and such natural resource exploitation as took place was extremely selective and in line with Japan's home requirements. If Taiwan cannot be said to be a "treasure" in terms of its food production potential, how can it be described in terms of its other basic resource structure? What is the relation of this structure to modern industrial development?

The Resource Base

Agricultural resources of industrial significance are few, not because the island is incapable of raising crops of this nature, but because increases in their acreages must take place at the expense of food crops already occupying both economically productive and marginal land. During the Japanese occupation, however, considerable emphasis was placed on the raising of fiber crops such as ramie, jute, sisal, and hemp, and the island supplied Japan with a small but important percentage of its industrial hard fiber imports. Some cotton was raised, and also silk, as a subsidiary source of income for the food-growing farmer. In each of these cases production fell off seriously after the war; the fiber crops fared badly in the competition for land with food crops which brought higher prices and which could be consumed at home if no other market were immediately available. However, jute, grown mostly in the southwest, is now produced in quantities approximating the prewar level, 10,840 metric tons in 1951, and supplies the greater part of the local demand for sacking. 1/ Also, the sugar industry provides bagasse in large quantities from which pulp, cellutex, and bagasse board are manufactured. 2/ Nevertheless, it is unlikely that without a revolution in the agricultural organization of the island, industrial crops will become of major importance. This does not refer to the planned increases in acreage of such crops as soybeans, peanuts, and seed crops such as rape and sesame, which provide cake for fertilizer after their oils are pressed from them. On the other hand, there is considerable uncertainty as to whether enough of these can be raised even for cooking oil, let alone to play the role of their pre-war Manchurian equivalents in fertilizer supply.

Forestry resources for timber and fuel represent a more substantial potential contribution to industry, but even here the problems are enormous. 3/ About two-thirds of the island is covered by forest or brush; 1.8 million hectares is estimated to be in forest alone. These figures, however, are based upon obsolete Japanese surveys and are believed to be excessively high. According to these same figures, 52 per cent of the forested area is in broad-leaved forest, largely evergreen; only 9 per cent is in conifers; the balance is mixed or "reforested." The fact remains that there is a vast forest capital on the island. Yet, before the war Taiwan imported about 60 per cent of its lumber from abroad, although lumber also appeared as an important export item in the Japan trade. The reasons for this situation are seen first in the nature of the forest cover which consists less of homogeneous stands suitable for mass cutting than of dense sub-tropical evergreen forests composed of numerous tree species and bamboos demanding selective cutting. Certain woods found in the mixed forests and the broad-leaved evergreen forest, such as cypress, teak, and cryptomeria, brought excellent prices in Japan, and these were assiduously culled and exported. A second major factor is the inaccessibility of a large part, roughly half, of the timber reserves which are high in the mountains and are at present untapped. At the same time, indiscriminate cutting for fuelwood, which is supplied entirely from domestic sources, and for making clearings for temporary cultivation, has resulted in the transition of about one-fifth of the total forested area to scrub lands with resultant loss of valuable forest resources and consequent acceleration of erosion.

It appears certain that the forest capital of Taiwan is rapidly declining under a system of inadequate control. The annual growth increment from accessible forest stands is estimated generously to be about 735,000 cubic meters. The annual drain for all purposes, including fuel, is estimated to be about 1.5 million cubic meters. At the same time the per capita consumption of wood of all kinds is considerably less than it was before the war, partly because of the increase in population, partly because of the limitation on imports. The picture is not wholly dark, however, since protection forests, 367,000 hectares, are maintained and a very large part of the present logging operation, mostly governmental activity, is said to be on a sustained yield basis. What remains uncontrolled is the local woodsman or shifting cultivator who hacks and burns in the heart of the forest. In summary, then the forest resources of Taiwan by appropriate regulated cutting and by reforestation of cutover areas should in time be able to supply the bulk of the island's needs for lumber, pulp, and fuelwood based on pre-war standards, but they cannot be expected to provide a stable resource upon which to base a large-scale industry.

The picture is substantially less bright with regard to mineral resources. Although the Japanese geologists explored the island, their surveys are known to be incomplete and in need of considerable revision. Nevertheless, all the indications are that, with few exceptions, Taiwan possesses an extremely modest amount of mineral wealth and few of the mineral requirements for modern industry.

Of the major metallic minerals most significant in the development of such industry Taiwan possesses none in really adequate supply with the exception perhaps of copper. In 1951, 504 metric tons of electrolytic copper was produced from the mine-water in a gold-copper mine 20 kilometers east of Chi-lung, and most of it was exported. For all practical purposes iron ore, bauxite and alumina, magnesite, and the other lesser metals are lacking, although 10,000 tons of low-grade bauxite are imported annually from the

Nationalist-held Quemoy Island for intermixture with imported ore. The Japanese reportedly were mining manganese during the early war period, but none is being produced now.

Non-metallic minerals are similarly limited. Sulphur is mined in the volcanic zone northeast of T'ai-pei in quantities sufficient to supply domestic needs, 2,776 metric tons being produced in 1951. Pyrites also are mined in the north, primarily for use in the fertilizer industry, and 6,700 metric tons were produced in 1951. However, preliminary figures for 1952 indicate a remarkable increase to about 30,000 tons, a figure at which it is believed production will level off, although under the Japanese over 62,000 tons were produced in 1941. Limestone of relatively poor quality is available for building purposes and for cement, as are gravels and clays used in the making of the local grey brick.

Salt is available in abundance, but it is derived not from rock salt, but from the evaporation of sea water along the relatively dry west coast. Enough was produced under the Japanese (a peak of ~~400,000 metric tons in 1943~~ ^{405,000 metric tons in 1943}) to supply Japan with a minimum of 100,000 tons a year. In 1951, from approximately 4,300 hectares of salt pans about 285,000 tons were produced, and about 240,000 tons were exported, chiefly to Japan and the Philippines, some apparently a carry-over from the previous season. 4/ Yet, the costs of production of Taiwan salt are high, in part because of the highly seasonal character of its production, 5/ partly because of the relatively higher labor costs, partly because of poorly coordinated and integrated production methods and high local transport costs. In any case, it is barely competitive with United States rock salt (even counting the Pacific Ocean freight charges) and it could not easily compete in price with the salt of the drier north China coast, the Red Sea coast, and Madura when and if these become available in quantity once more. Estimates for 1952 indicate a possible production peak of near 400,000 tons.

On the other hand, petroleum, which was the focus of much developmental effort before the war by the Japanese, no longer is produced in significant quantities. At present, all of Taiwan's demand for crude petroleum is met by imports, chiefly from the United States. Refining is done at the former naval fueling station in Kao-hsiung, restored after the war and capable of producing all requirements other than high-octane aviation fuels.

In general, however, the fuel and power picture is the most favorable in terms of natural resources. The one relatively abundant mineral resource is coal. Reserves are estimated at some 419 million tons, mostly in the vicinity of the T'aipei Basin, largely a relatively low-grade, sub-bituminous coal, of low calorific value, not generally suitable for coking purposes. Pre-war annual production averaged about 2 million metric tons, but rose to 2.8 millions in 1941; preliminary reports indicate a production of 2 million tons in 1952. At this rate of production supplies should last over 200 years. It should be pointed out, however, that the workable seams seldom exceed three feet in thickness and this fact creates difficulties in working them. Moreover, flooding is not uncommon.

Taiwan also is fortunate in having a number of short but swift-flowing rivers which possess a gross hydroelectric potential of some 3.3 million kilowatts. 6/ Most of the streams are characterized by extreme variation of flow, however, so that their firm potential is much less. Under Japanese rule less than eight per cent of the gross potential had been developed, 252,000 kilowatts in 1943, a peak year. In addition, there was a thermal installed capacity of 56,000 kilowatts, making a total of 308,000 kilowatts. There were two major disconnected systems, one on the East coast, with a gross capacity of 54,000 kilowatts; a second on the much more highly developed West coast, with a capacity of 254,000 kilowatts. The core of the latter, with a total capacity of 143,500 kilowatts, was the dual plant at Jitsugetsutan, or Sun Moon Lake, near the geographical center of the island. These were, and are, the only installations fed by artificially stored water, the rest of the hydroelectric installations being so-called "run-of-river" plants. The actual reliable peak capacity of the system, however, never exceeded the 178,000 kilowatts reached in 1944, before Allied bombings severely damaged the Jitsugetsutan installations. After the war, the installed and peak capacity of the system was halved, but by 1949 the basic installations had been restored; by 1950 peak capacity exceeded the Japanese maximum and reached 181,000 kilowatts. In 1951 installed capacity reached 304,000 kilowatts and peak capacity, 217,000. Total generated power reached 1.29 billion kilowatt-hours, exceeding the Japanese maximum of 1.195 billions in 1943.

The fact that the distribution of water on the island is uneven and that rainfall on the eastern and less developed side is more reliable than on the more highly developed western side, made it desirable to interconnect the separate power systems. This connection was completed in December, 1951 by the construction of a cross-island transmission line which is transferring some 18,000 kilowatts to the western side of the island. That the seasonal variations in the availability of water are significant is made clear by the power shortage in the winter of 1950-1 when the waters of Sun Moon Lake reached their lowest ebb in years and rigid rationing was imposed. The function of the thermal plants as standby plants, as well as primary producers, has been established, and immediate future development may well be concentrated on the development of further thermo-electric installations. Long-run power development, however, may well stem from the further exploitation of water power resources. Their effectiveness will probably depend upon the possibility of providing stored water, as at Jitsugetsutan, which is less affected by periodic droughts. In 1952, completion of the T'ien-lung hydroelectric plant increased the installed capacity to 331,000 kilowatts, and all indications were that power generation would exceed the 1951 level by a considerable margin. The entire system is under the control of the public Corporation, the Taiwan Power Company.

The Progress of Industrialization (1936-52)

Until 1936 and the "China Incident", industrialization in Taiwan was practically non-existent. The basic industry was food processing, chiefly sugar refining, which is essentially an adjunct of agriculture rather than an independent process. In 1936 the "foodstuffs" category of industry accounted for more than 70 per cent of the total value of industrial production, and of this 70 per cent over 90 per cent was accounted for by sugar, molasses, and alcohol. Of the 30 per cent of industrial output remaining, a third consisted of chemicals, including camphor and its products, lime, cement, fertilizers, coke, drugs, soap, and vegetable oils. The balance consisted of metal products and machinery, some textiles, lumber, pulp and paper, and ceramics (chiefly bricks and roofing tiles). On the other hand, much was accomplished in providing Taiwan with many of the so-called "external economies" which the British provided for India and the Dutch for Java. Major port facilities were developed at Kao-hsiung and Chi-lung, with lesser ones around the coast; a railway net was built over the entire western part of the island, although the eastern part remained isolated, but with one railway of its own. ^{7/} Roads were built to tie in the east and west coasts and to feed into the railways; a power system was developed and expanded rapidly; coal mines were exploited, primarily for local use, although some coal was exported. Banking facilities were established and finally an administrative organization was created which, whatever its failings in terms of democratic ideals, resulted in a notable stability of political and social conditions.

By 1937, however, the electric power from the Jitsugetsutan installations had become generally available and a certain expansion of industry had taken place along lines directed by the government. The chief emphasis was on metals and chemicals (but not fertilizers), and a number of plants were established and projected in these fields. Textiles, the traditional product of agrarian economies in transition toward industrialization, were almost entirely neglected. The most important development was the establishment of aluminum plants using hydroelectric power, based at Kao-hsiung and Hua-lien. The former had an annual productive capacity of 12,000 tons of aluminum and 24,000 tons of alumina refined from Bintan bauxite; the latter a capacity of 10,000 tons of aluminum derived from alumina produced from ores previously processed in northern Kyushu. Other metal-refining plants, chiefly for manganese refining and processing, were established. One plant near Chi-lung also produced ferro-silicon from raw materials imported from Japan and Manchukuo; another produced ferro-magnesium from Manchurian magnesite; a third, located between T'ai-pei and Chi-lung, produced iron and steel in limited quantities.

Fertilizer production amounted to only a fraction of the islands needs although after 1939 there were plants producing both ammonium sulphate and superphosphates, the latter from Angaur rock. Cement production, largely from domestic raw materials and primarily from the plant near Kao-hsiung, ^{8/}

rose from 143,000 metric tons in 1936 to over 303,000 in 1944, although much of this output did not go to meet local civilian needs. Alcohol, a by-product of sugar refining, was the heart of the chemical industry and accounted for 20-25 per cent of the total value of chemical output and a substantial share of chemical exports.

The high priority given to power-oriented metallurgical industries is indicated by the percentages of power consumed by them. Approximately 60 per cent of all electric power consumed in 1937 went into industry, of which about one-third was consumed by the metal refining industries. By 1943, however, over 91 per cent of the electric power was consumed by industry, of which about 70 per cent went into the metal-refining industries, chiefly the aluminum industry. Since the amount of electricity generated rose less rapidly during this period, it would appear that the availability of power for the general consumer (widespread in almost every village of size on the island, as in Japan) declined greatly, and the highly specialized expansion of the island's industry took place at high cost to the local standard of living.

The number of persons employed in industrial enterprises with ten or more employees in 1938 amounted to some 170,000 persons, but this figure includes those persons employed in food processing and mining, industries which are reported to have employed more than half the total. 9/ Only a handful of plants employed more than 300 persons; most employed less than thirty, and the average employed ten or less. For this reason the industrial labor force must have been larger than noted above, but even if it were assumed to have been more than 200,000, it still would have been little more than ten per cent of the total labor force. Although not an inconsequential percentage when compared with estimates for China Proper, this percentage compares unfavorably with Japan's estimated 25 per cent.

Labor in Taiwan, as in many other parts of Asia, has been characterized by extreme mobility and a lack of mechanical skills. The ties between farm and factory worker is strong, and during the Japanese period, there were severe seasonal labor shortages during the major harvest and planting periods. In fact, the Japanese talked of importing labor from the mainland to make up the difference. Furthermore, most of the skilled and supervisory positions were held by Japanese, partly as a matter of Japanese colonial policy. There were almost no Japanese laborers other than those few engaged in agriculture as owner-farmers. Many of the Chinese were employed on a contract basis under the control of Chinese labor procurers in much the same manner that contract labor was employed in China Proper, Southeast Asia, and India.

It appears, therefore, that Japanese "industrialization" of Taiwan was restricted to a very narrow range of enterprises owned and run by Japanese and clearly oriented toward, and integrated with, Japan's planned objectives in East Asia. It was superimposed upon a population which remained dependent upon imported commercial fertilizers with which to maintain agricultural productivity and upon imported consumers goods. There was, however, a significant increase in the output of metals and chemicals after 1937, but this was due to temporary and heavy emphasis on strategic industries designed not to support or supply a domestic economy but to buttress the externalized Japanese war economy.

Taiwan's industry after 1945 experienced major changes, in part because of the damage to installations suffered during the war from Allied bombing and from neglect, in part because of the planned shifts in industrial emphasis implemented especially since the first of 1949. The nature of these shifts is indicated by the power consumption pattern in 1951. Of the 956 million kilowatt hours of electricity consumed, a slightly higher figure than that of the highest year (1943) under the Japanese, industrial consumption accounted for 73 per cent. 10/ The distribution of electrical energy consumption among the various industries had changed a great deal in those eight years. In 1951 metals took less than 20 per cent of the energy consumed by industry; mining took about 9 per cent, textiles took under 4 per cent; but chemicals took over 43 per cent, 290 million kwh as compared with 41 million in 1943. 11/

The increase in the consumption rate of the chemical industries has been a consequence of the increased emphasis placed on fertilizer production since 1949. In 1951, approximately 115,000 metric tons of chemical fertilizers were produced on the island, of which 48,000 tons were calcium cyanamide and over 54,000 tons were calcium superphosphate. 12/ This represented only about one-fourth of all the commercial fertilizers used in Taiwan in 1951, the balance having been imported. However, a very great increase in fertilizer production has taken place since 1938 when the island's productive capacity was only 27,000 metric tons for all kinds of fertilizers. Although statistics for 1952 were not available at the time of writing, it is believed that the production of cyanamide reached 70,000 metric tons and that the total production of all fertilizers exceeded 150,000 tons, about a third of the total amount consumed. The major plants are at Kao-hsiung and Hsin-chu, and the Taiwan Fertilizer Company, a government-owned corporation, is the leading fertilizer manufacturer.

The diminution in power consumed by the metals industries is reflected in the decline in aluminum ingot production from 12,000 tons in 1942 to under 3,000 tons in 1951 and an estimated 3,500 tons in 1952. 13/ Almost all of the ingot production is consumed internally, which was not the case during the Japanese occupation, and much of the ingot production is rolled into sheets and manufactured into various aluminum appliances by a variety of small private manufacturers.

A major change also has taken place in the cotton textile industry. The production of cotton cloth in 1951 was 56.6 million yards, and in 1952 production is estimated to have reached 70 millions. 14/ Since the total demand at present living levels is estimated at 96 million yards, it appears that the domestic textile industry is near to satisfying the domestic market. Already the imports of textiles from Japan are falling, and in 1951 they amounted to less than one-third of total production on the island. At the same time the production of cotton yarn from imported raw cotton has been increasing as the number of spindles in operation has risen from some 25,000 in 1949 to 121,000 in 1952. In 1951 the cotton yarn produced amounted to 40,000 bales (of 400 lbs. each) and in 1952 it is estimated that 60,000 bales were produced. Eventual expansion of the spindleage to 170,000 will result in the production of enough yarn to satisfy immediately foreseeable requirements.

Cement production from three plants at Kao-hsiung, Su-ao, and Tsu-tung, all originally established by the Japanese, amounted in 1951 to 390,000 metric tons and the estimated production in 1952 was about 400,000 tons. 15/

^{ment}
This is more than the immediate needs of the island, and a surplus is available for export.

Pulp and paper also are produced in some quantity, the former largely from bagasse. Since pulp from bagasse is not competitive under present production techniques with imported wood pulp, production in 1952 was allowed to drop radically. Paper production, though well below the 1942 peak of 54,000 tons, is up to the 1939 level of some 21,000 tons. ^{16/} However, the demand for paper of all kinds is very much greater than the domestic supply. Experimentation with bamboo as raw material for pulp has been going on, but there is no commercial production. Cellutex and hard bagasse board are valuable building materials produced by the Taiwan Sugar Company and the Taiwan Pulp and Paper Company, both government corporations. Production of the former is well below pre-war levels, but the latter is a post-war product now being made in increasing quantities. Despite its potentialities as a fuel, as a fertilizer raw material, as a source of pulp and paper and building materials, bagasse remains one of the more neglected resources of the island.

There also are a number of metal-working plants using chiefly imported steel scrap and pig iron. ^{17/} Some ship repairing and small shipbuilding also is done in association with the two major ports. Handicrafts in metals and indeed in most other fields of manufacture are omnipresent and are organized along traditional Chinese guild lines.

In spite of the many changes in the structure of industry, the level of industrialization on the island in terms of percentage of labor force employed and its share in gross national product is not dissimilar to what it was under the Japanese. ^{18/} To the extent, however, that more Formosans are being trained and utilized in skilled jobs and more emphasis is being placed on industries oriented toward the internal needs of the Formosan economy, ^{19/} present trends indicate greater possibilities in the use and development of Formosan resources.

FOOTNOTES TO CHAPTER II.

^{1/} Apparently, local jute production is almost sufficient to supply local demands, but facilities for the production of bags are limited, and 5.24 million bags were produced in 1951 to meet an estimated demand of some 10 million bags. Industries of Formosa, p. 17. (mimeographed MSA report dated June 1952).

^{2/} In 1942 2.5 million square meters of cellutex were manufactured; 693,000 in 1949 and less later. In 1951, 202,000 square meters of bagasse board were produced. Economic Fact Book, Volume II, October, 1952, Section III-D. (mimeographed by MSA, 1952).

^{3/} Information concerning Taiwan's forest resources is summarized in P. Zehngraft, "Forest Conditions in Taiwan," Chinese-American Economic Cooperation, September, 1952, pp. 79-87. A statement of the forestry problem and remedial recommendations is given briefly in T. Gill, Forest Policy and Program for Taiwan, Taipei: JCCR, 1952 (mimeographed).

- 4/ Internal consumption of salt in Taiwan is estimated at 75,000 metric tons per year. The balance is available for export. Salt production is a virtual monopoly of the Taiwan Salt Works, a government enterprise.
- 5/ Production stops during the summer rainy season.
- 6/ The Electric power system in Taiwan is summarized in Electric Power in Taiwan Today (T'aipei: Taiwan Power Company), August, 1952.
- 7/ In 1941 there was an integrated system of about 735 kilometers on the western side, with a gauge of 3'6", the same as that of Japan. The east coast line, about 176 kilometers in length, has a gauge of 2'6".
- 8/ Gypsum is not found in commercial quantities on Taiwan and is imported at a ratio of 3 tons to 100 tons of cement. A second cement plant is located at Su-ao.
- 9/ U. S. Navy, Civil Affairs Handbook, Taiwan, Economic Supplement, pp. 46-47.
- 10/ Although 956 million kwh were consumed in 1951, 1,285 million kwh were generated. The difference reflects losses in transmission, etc.
- 11/ MSA, Economic Fact Book, Volume II, October, 1952, part VII - B.
- 12/ Ibid., part III - A.
- 13/ Ibid., part I - A.
- 14/ Ibid., part II - B.
- 15/ Ibid., part V - B.
- 16/ Ibid., part III - D.
- 17/ Ibid., parts I - B, I - C, I - D. Various types of light machinery -- pumps, looms, rice polishers and threshers, oil presses, lathes, drills, sewing machines, etc. -- are manufactured in small quantities.
- 18/ A. Logan, "Recovery of Taiwan Industry and its Relation to MSA Industrial Aid," Chinese-American Economic Cooperation, October 1952, p. 3, Table I.
- 19/ The value of the output of food processing industries fell from 36 per cent of the total industrial production in 1941 to 27 per cent in 1952.

III. TAIWAN'S DEVELOPMENT UNDER JAPANESE RULE

In the preceding sections of this paper the nature of Taiwan's development has been summarized. The method of this development is another story.

To a considerable extent what Japan accomplished in Formosa was much the same as that accomplished by many other nations in the development of their colonies. Colonial resources were so utilized as to maximize material gains for the ruling country. On the other hand the Japanese in Taiwan represented a special case. For one thing, there is every reason to believe that the amount of gain, relative to population and resource endowment, was both greater and more rapid in Taiwan than in most other colonies of modern times. For another thing the similarities between the material aspects, particularly, of Japanese culture and the Chinese culture on Taiwan were such as to make the developmental procedures different from those elsewhere.

In a sense the place of the Japanese has now been taken by a new ruling elite, this time mainland Chinese, but to a considerable extent it is still foreign to Taiwan, which represents ethnically only a very small portion of China proper and had been for half a century under Japanese control. It seems reasonable therefore to assume that part of the developmental process under the Japanese may resemble that facing the present authorities, and lessons may be derived from an understanding of the Japanese development which will apply to the situation today.

Characteristics of Japanese Economic Development...

Japan looked to Taiwan as a major source of foodstuffs with which to counter part of the 20 per cent food deficiency in Japan. It hoped also that Taiwan would become a source of vital raw materials to supplement Japan's limited resources, but these hopes were constrained by a lack of significant natural resources, other than agricultural. Almost all of Japan's period of control over the island, therefore, except for the last decade, was characterized by an overwhelming emphasis on agricultural expansion. Following the same direction of effort, about half of the total production of all commodities in Taiwan was exported, for all general purposes, to Japan.

Did development actually take place? Judging by the enormous increases in production of agricultural commodities, the answer is yes. The amount of rice produced more than doubled between 1905 and 1935. 1/ Sugar production tripled between 1910 and 1940. 2/ These production gains kept well ahead of increases in population.

Did these gains materially affect the living standards of the Taiwanese? Since the island was a colony being developed along restricted lines not necessarily directed toward bettering the welfare of the inhabitants, such advantages were relatively small, but they did exist. The Taiwan farmer ate rice; this was not always true even in South China. He often had meat; this was rare in China. He was simply but adequately clothed, not always the case in China. He had some opportunities for obtaining employment off the farm. It is true that he was greatly exploited, but apparently not unmercifully. The Japanese regulated wages and hours,

along Japanese lines, although they set different wage scales for Japanese and Taiwanese. 3/ They also limited rents, introduced standardized contracts, 4/ and in effect anticipated some of the measures recently promulgated through the rent reduction program.

Did all this benefit Japan? Emphatically, yes. Not only did Japan receive the needed foodstuffs and some raw materials that she hoped to get, she also reaped the advantages accruing to the Taiwanese export surplus of trade, which necessitated no loss of foreign exchange since the Taiwan yen was linked to the Japanese yen and was based on holdings of Japanese government bonds in the Bank of Taiwan. The value of these surpluses amounted to about 100 million yen a year, almost a third of the gross value of imports in 1938. Furthermore, the amounts of postal savings receipts transferred to Japan and the direct surplus banking transactions from Taiwan to Japan, for which there are no statistics immediately available, are estimated at some 50 million yen annually. Thus, every year, for at least fifteen years previous to the war, Japan is believed to have gained directly 150 million yen from her investments in Taiwan, and for the fifteen years before that lesser but still significant sums. If it is understood that a proportion of the Japanese exports to Taiwan were for military purposes and that the Taiwan government was completely self-supporting after 1905, these generalizations become even more significant.

TABLE I. TAIWAN'S TRADE WITH JAPAN

	Exports <u>a/</u> (in 000 yen)	Imports <u>b/</u> (in 000 yen)
1896 - 1900	2,860	4,888
1911 - 1915	49,122	40,071
1926 - 1930	215,210	127,666
1936	358,895	243,832
1938	420,104	327,950
1939	509,745	357,608

a/ Percentage of Taiwan's exports to Japan:

1896 - 1900 = 19.6
 1926 - 1930 = 85.5
 1937 = 93.2 (95 including Manchuria)

b/ Percentage of Taiwan's imports from Japan:

1896 - 1900 = 27
 1926 - 1930 = 68.3
 1937 = 83.4 (92.5 including Manchuria)

If the above estimates are at all reasonable, they show interest payments on what must have been a huge capital investment originating in Japan. What was the extent of this Japan-originated capital? Estimated figures for 1939 indicate that, as of that date, the Japanese had invested some 800 million yen since they assumed control over the island. 5/ This seems a very moderate sum, certainly, in relation to the dividends that were being returned. All of the investment would have been paid off in effect during the five-year period 1935-1940. It appears further that a large percentage of this investment did not originate in Japan at all, but originated in Taiwan, where it was invested by the Taiwan

Government-General or by corporative or private Japanese investors. Of the 800 million yen, about a third consisted of Taiwan government enterprises. Much of the industrial investment of 350 millions was partly from government funds in association with corporative capital. 6/ From 1899 to 1937, 163 millions were invested in railways alone. 7/

The total debit trade balance between the two areas in the early days of control (1895-1905) amounted to only 30 million yen. Furthermore, the amount of direct subsidies to the sugar industry in all amounted to only 13 million yen between 1902 and 1932. 8/ Even allowing for the costs of establishing administrative and military control over the island in the early period, it seems that the amount of Japan-originated capital injected into Taiwan during the Japanese era amounted to little more than the export surplus of Taiwan in two years of the late thirties.

Definitive conclusions await more detailed studies of the structure of the Japanese economy. The division between governmental and private investments in the Empire still remains unclear, and the records of Japanese companies with major interests both in Japan and the colonies have not been studied here. Even so, on the basis of admittedly limited evidence, it seems clear that except for the decade 1895-1905, most of the development of the Taiwan economy during the Japanese administration was financed by Taiwan-originated, externally organized capital. 9/

Three Periods of Development

The Japanese recognize three periods during which they pursued differing policies toward the ceded island. The first extended roughly from 1895 to 1914; the second from 1914 to about 1932; the third from the latter date on.

During the first period the emphasis was on the consolidation of political power and on laying a groundwork upon which later development could proceed. The Japanese government waged military campaigns against the aborigines, and by 1904 or so had made secure the greater part of the arable areas within the island; transportation facilities were expanded and the railway which had been begun by the Chinese to connect T'ai-pei and Chi-lung was completed and extended southward along the western plains to Kao-hsiung; port facilities, especially at Chi-lung and Kao-hsiung were constructed; and roads were built both for commercial and military purposes. The establishment of these facilities and the pacification and even local elimination of the aborigines made available additional arable lands which had not previously been accessible. Most of these were brought under cultivation within a very short time, but with relatively little direct participation of the government.

Since the land was the basis of livelihood and since taxes upon the land were expected to be a prime source of government income, as they were in Japan, a Land Survey Bureau was established in 1898, of which the chief task was an accurate survey of land and property rights. 10/ The result of this survey completed in early 1905 indicated that the total amount of land under cultivation was over 633,000 hectares as compared with the previously recorded figure of about 362,000 hectares. 11/ This near-doubling of the amount of land under cultivation, however, was not due primarily to large additional amounts of land coming under cultivation, but to the inadequacy of the previous land census of 1886. The immediate

result of the survey was a jump in the volume of rent receipts to the government, but a more significant consequence was the final clarification of the Taiwanese land ownership system which had been unbelievably complicated. 12/

Upon the completion of the land survey, the Japanese promulgated the so-called Land Investigation Regulations, the immediate results of which led to a standardization of units of land measurement, a recording of cadastral rights throughout the island, and increased efficiency in tax collection. The rights of the great landlords were abolished by decree of the Imperial Diet and were purchased through the issuance of government bonds valued altogether at about 4 million yen, while ownership was conferred on the so-called "tenants" of whom many were subleasing lands to second-degree tenants. Tenancy, therefore, was not abolished, as the law operated only down through the first level of tenancy; nor did it prevent former landowners from investing some of their government bonds in land and becoming landowners once more. Despite the limitations of the act, it appears that the first-degree tenants were contented with the ownership of land, although it becomes clear that later on they realized the full burden of government taxes which had before been the responsibility of the great landlords. The former landowners were pacified by the bonds with which they were reimbursed and by the relief from taxation on their lands. 13/ A further result was a rapid stabilization in land values and tenancy, and it was this aspect of the program which stimulated Japanese agricultural investment in Taiwan, primarily in sugar. 14/

The agricultural land program was followed by a survey of forested areas and by the eventual appropriation of almost all of the forest lands by the government. Thus, a virtual government monopoly on timber and forest products was established. 15/

In this early period also the government monopolies over salt, camphor, and opium were set up, and in the 1903 accounts of the Government-General these monopolies accounted for 40 per cent of the total government revenue. 16/ Later, monopolies over tobacco and alcoholic beverages were also established. The government took over responsibility for transportation facilities and also the income to be derived therefrom. At the same time, the powers of the Government-General were assigned in such a way as to make the island decreasingly dependent on Japan proper and to give its administration an autonomy which might not have been expected in a colonial territory. In 1898 the Bank of Taiwan was founded as a government institution which was to engage in routine banking operations and also was to act as the official note issuing agency and as the fiscal arm of government.

In laying the groundwork for development the Japanese also made studies of the indigenous culture with which they were to deal. 17/ Moreover, they adopted one of the salient organizational features of the Chinese society occupying the island, namely, the pao-chia or hoko system. This was an ancient system of political and social organization centered about the family or household and groups of households, which had been imported from the Chinese mainland. 18/ *Similar to Japanese Buraku*

The second developmental period stems from about 1914 and continues to the Manchurian Incident of 1931-2. During this period emphasis was on intensifying agricultural activity. Cultivated lands and irrigation.

facilities were expanded, and marketing controls of agricultural products were established. Transportation facilities were improved, and agencies were established to engage in agricultural research. The Imperial University of Taiwan (Taihoku Teikoku Daigaku) was founded in 1928, and its facilities were quickly linked to agricultural development. The period ended with a highly developed agricultural economy based on exports of sugar and rice primarily, with lesser exports of sugar-refining by-products, pineapples, bananas, tea, camphor, and high quality construction timber, with increased controls over agricultural production and marketing, and with control of the economy in the hands of a relatively few Japanese sponsored by the Government-General. Meanwhile, the island had passed almost completely within the trade orbit of Japan.

The third period, beginning in the early thirties and lasting through the war, was characterized by a major emphasis on industrialization and by the entry of the government into all phases of economic affairs. Both production and consumption, as might have been expected in a colonial economy placed on a war footing, were closely regulated. The government participated in the establishment of non-agriculturally based industries and gave every assistance to Japanese corporations in their industrializing activities. The Taiwan Development Corporation, similar in purpose to the Manchurian Industrial Development Company and the Oriental Development Company in Korea, was established with 30 million yen of government funds in 1936 to develop industry both in Taiwan and in the Nanyo (lit. the "south seas," or realistically, "Southeast Asia"). The latter part of this dual function indicated the value the Japanese placed upon Taiwan as a base of operations for southward expansion.

The Nature of Japanese Political and Social Control

The power of the Government-General permeated the entire Formosan economic and social structure. Taiwan was organized politically into strict hierarchical patterns with the Government-General at the top of the pyramid, the provincial governors next, the county heads next, and the city, township, and village heads last. All of these last named officials were appointed by the Governor-General, and membership down through the county level was in practice restricted to Japanese.

The county head occupied an especially significant position since he was also the head of the local police, and it was through him that national policy was implemented on the local level. He was the person to whom the township and village officials reported, and it was under his supervision that censuses of economic and political information were taken. The city mayors, however, were responsible directly to the governor of the province.

The hoko system of organization provided the broad base of the administrative pyramid. As indicated previously, it consisted of an adaptation of the Chinese pao-chia system of community organization by families. The unit of the system was the family, the next largest unit the ko, which consisted of ten families, and the largest unit the ho, which consisted of about 100 families. The leaders of the ho and the ko were elected by the heads of the individual households, but the appointment of the ho elder was subject to the approval of the county head and the provincial government, while the ko elders had to be approved by the county and local police authorities. In effect, moreover, the group was held responsible for the actions of the individual, and this made the hoko members effec-

tive, if often unwilling, supporters of the administration and the police in uncovering malcontents and preserving public order. 19/ The control of the Japanese over this organizational system, therefore, was maintained at both high and low levels, and was buttressed by the eventual requirement that the elders elected must have a knowledge of Japanese. 20/

The Japanese also controlled the persuasive media offered by the so-called "associations," which were modeled on their Japanese equivalents, the humi, but which also had their roots deep in the indigenous Chinese society and therefore proved especially useful in organizing local effort. The hoko itself may be considered an example of such an association. All associations, whatever their function, were subject to governmental control or police surveillance in direct or indirect form. The functions of these associations were diverse and included credit, marketing, purchasing, and joint utilization activities, as well as the general production and retailing functions of the consumers' cooperative. Special associations existed for various industries, and it was through the nokai (agricultural associations) that the government introduced many of its agricultural innovations. The associations were self-financing, and were often promoted by the government directly through the medium of the county or lesser officials.

The supplying of credit was a major function of the associations, and in 1940 more than "500 associations -- approximately one per village -- had been organized and were operating under the Taiwan Industrial Association Regulations, originally enacted in 1913." The deposits of the credit associations, both urban and rural, in 1941 amounted to more than 220 million yen, and provided the chief means by which the non-Japanese could obtain credit. 21/ As long as the activities of the credit associations were directed toward policies in line with those of the Government-General, they operated with little interference, but since the heads of the associations were subject to the approval of the government, any aberrations from an accepted norm resulted in a change to more pliable executive personnel. 22/

The associations overlapped each other in a variety of ways. The agricultural associations were overlapped in form, area, and function, by the livestock associations, the various crop growers associations for almost every crop grown in Taiwan, the rice associations of producers, sellers, and warehousemen, the water utilization associations through which the government was able to control the distribution of irrigation water, and numerous others. In each case, however, the ultimate determinant of policy was the government, operating either on the local or the island level, but almost always by indirection and with semi-popular participation in everyday affairs.

The Problem of Capital Organization

As indicated previously, the bulk of the capital which participated in the development of the prewar Taiwanese economy, though Japanese owned, apparently was not Japanese originated. Nevertheless, a significant amount of Japanese capital came into Taiwan. The attractions were these: (1) political stability and control, (2) abundant and lenient credit offered by the Japanese-controlled banks, (3) protection offered by Japanese tariffs, and (4) a stable currency. Most of the private capital which first entered the country went into agriculture, into the purchase of land and the struc-

tion of mills for the sugar industry. Other capital went into mining, especially that of coal and gold. 23/

The largest single investor in Taiwan economic development, however, was the Government-General. Moreover, it was the largest and most effective accumulator and organizer of capital. The means by which the Government-General collected and organized capital are suggested in the previous discussion of political control. As early as 1905, the Japanese claimed there was no tax evasion to speak of in Taiwan, and one of the major factors which led to this situation was the political organization -- from Governor-General down to the single family -- checked and supported by an all-pervasive police organization.

By far the greatest source of income for the government, however, came from the Monopoly Bureau and the government monopolies on salt, opium, tobacco, camphor, and alcoholic beverages. The government also operated the railways and the other means of communications, as in Japan, and such profits as accrued also became a source of income. In 1935, over 80 per cent of the government's ordinary revenue, and 75 per cent of the total revenue, came from these government enterprises and properties. 24/ The single largest sources of income were the railways, the liquor monopoly, and the tobacco monopoly in that order, but the expenses associated with the government/railways also were much the greater and nearly balanced expenditures. The net income from government enterprises and properties in 1940 amounted to about 80 million yen, 40 per cent of the total budget.

In effect, then, the government maintained itself on the receipts derived from the monopolies and other enterprises which it operated and from taxes levied primarily on the agricultural population. The circulation of money could be controlled in large part by the central bank, which issued currency and played much the greater role in the banking life of the island. On the other hand, capital from private corporations in Japan often was utilized in association with Government-General capital in the semi-private corporations. Profits were augmented by the transfer to Taiwan, at relatively small cost to the company, of commercial and financial branches which performed the middleman functions for the entire Taiwanese economy. Zaibatsu shipping, trading, and banking agencies especially profited from this favored situation. 25/

The Promotion of Economic Development

Although the extent of government subsidization declined rapidly after the end of the first period in Taiwan's developmental history, subsidies continued to play an important role in the economy. Between 1935 and 1940 direct subsidies averaged about 8 million yen a year, of which at least one million were devoted to the financing of petroleum exploration and exploitation.

One of the more important outlets for government developmental activities was irrigation. There were three kinds of irrigation organizations in Taiwan: the first, public; the second, the water utilization associations; and the third, private. The third accounted for only 15 per cent of the total area irrigated in 1939, and was fast declining in importance. The control of irrigation facilities was, of course, a major weapon in the Japanese struggle to control the island as a whole and shape its economy to Japanese ends. 26/ The public associations controlled these irrigation

systems of particular public concern and were directly under governmental control. The water utilization associations bore some semblances of private enterprise, but in fact were organized and operated under government regulations and frequently under government auspices. Although in general more than half of the costs of constructing irrigation works were met by the government, their operating budgets, by and large, were paid out of assessments from local membership, rather than from government subsidies.

The government also supported research in agriculture, and each province contained a number of agricultural agencies directed toward increasing production and lowering costs. In Taihoku (T'aipei) province, for example, there were several branches of the Rice and Other Cereals Bureau which were concerned with the grading and marketing of rice, a rinderpest serum production office, a weights and measures station, several plant inspection offices, a rice plant nursery, a tea inspection station, a tea industry training station, a sericulture office, a fertilizer inspection station, monopoly bureau branches, which oversaw tobacco production, and several agencies of the Taihoku Imperial University, such as agricultural experiment stations, a sugar cane nursery, and a livestock breeding farm. 27/✓

Most of these agencies, other than those affiliated with the University, were under the control of the Industrial Development Bureau of the Government-General. 28/✓ This bureau also maintained research organizations and advisory agencies in all industrial fields ranging from hats, to pineapples, to afforestation. Another government bureau was the aforementioned Rice and Other Cereals Bureau which controlled the inspection and price of rice directly and indirectly through the rice producers and merchants associations. The traffic bureau, which maintained the railways, and the department of communications, which controlled the telephone and telegraph systems, also had separate administrative status, as did the Monopoly Bureau which not only regulated the production of its commodities, but also operated factories for their manufacture as in the case of opium and camphor. The University itself was a separate agency which had under its control agricultural experiment stations, forestry experiment stations, industrial research stations, and sugar industry experimental stations, which were operated both at the University and in branches all over the island. 29/✓

Thus, stimuli were applied to the economy to keep it a "going concern." The Japanese plowed back into the land considerable amounts of profits and tax receipts, and developed and forcibly introduced new agricultural techniques which continued to raise per unit and per capita agricultural output long after the cultivated land area ceased to expand rapidly.

The long-run Japanese plan envisaged economic development primarily in terms of increased agricultural production accompanied by the construction of an efficient transportation network including port facilities and followed by the development of power resources which are basic to any major industrial enterprise. Such other resources as were exploitable with minima of required capital were tapped: salt, forests, coal deposits, by-products from sugar refining such as alcohol, and minerals such as gold. Economic self-sufficiency for the island, until after 1941, was not a consideration; it was to be one specialized cog in the Japanese machine and dependent on Japan for such producers' and consumers' goods as it required. 1

As a colony, it was developed under a system of coercion rather than consent.

FOOTNOTES TO CHAPTER III.

- 1/ C. S. Ch'en, Land Utilization in Taiwan, p. 116 (in Chinese).
- 2/ Ibid., p. 163. The production curve was not without major fluctuation, but the trend was clear throughout the period.
- 3/ U. S. Navy, op. cit., Economic Supplement, p. 47.
- 4/ Contractual standards, however, apparently were directed in large part toward regulating the relations between the sugar companies and the small cane-producing farmers.
- 5/ U. S. Navy, op. cit., Economic Supplement, p. 4. There is considerable question regarding the actual amount of Japanese investment, and indeed the meaning of the term itself. Ch'en, in the Chinese text of his land utilization study, indicates that the amount approached 1.3 billion yen as early as 1929, (p. 45), but he, like so many Chinese and Japanese writers, offers no concrete data concerning the "flow of Japanese capital" in to the island.
- 6/ The Taiwan Keizai Nenkan, 1942 makes it clear that 350 million yen did originate in Japan, by an analysis of the paid-up capital of the stock companies incorporated under the island law. Since this sum amounted to about two-thirds of the total corporative investment in all industries (including agriculture), it is argued that Taiwan was heavily dependent upon Japanese capital during the developmental process. The yearbook fails to make clear, however, how much of the invested capital came from profits gained in activities localized on the island.
- 7/ U. S. Navy, op. cit., p. 4.
- 8/ Indirect subsidization took place through Japanese import tariffs directed against non-Formosan sugar and government subsidies to irrigation and other works which materially assisted the sugar industry. For information on sugar duties, see S. Nasu, Aspects of Japanese Agriculture, IPR, New York, 1941, p. 56.
- 9/ A similar conclusion was reached by A. J. Grajdanzev in his Formosa Today (IPR, New York, 1942).
- 10/ Takekoshi, op. cit., pp. 126 ff.
- 11/ Ch'en, Land Utilization in Taiwan, p. 46 (in Chinese).
- 12/ In brief, land ownership had been concentrated in a relatively small number of great families, most of which had obtained their land as a result of services rendered previous governments, or by pioneering occupation. Under them were tenants, later arrivals who had placed themselves under the suzerainty of the great families. In time, however, there developed tenant's rights to land, in the Fukien custom, whereby rents were still paid to the landowner, but the tenant could not be dispossessed and could dispose of his rights to his land as he pleased. As the landowners withdrew from active supervision of their properties,

- the "tenants" began to sublease their lands to more recent arrivals along the inland agricultural frontier particularly, and themselves became landlords. Thus, there developed a three-layered hierarchy of great landowners, tenant-landlords, and subtenants. In addition, the government itself, through reclamation activities and expropriations, also had become a landlord, further complicating the land tenure picture.
- 13/ Somewhat wishfully, Takekoshi says: "The landowners have received (benefits), for now there is little likelihood of their being cheated by cunning and unscrupulous tenants, and having to pay taxes to the Government for fields which bring them in no rents. With a goodly number of Government bonds secure in their cash-boxes, they can spend the rest of their lives in happy retirement." Op. cit., p. 132.
- 14/ Ch'en quotes a Japanese author, Uyehara, Tadao, as saying that the survey and the following legislation, "1. promoted knowledge of the area, thereby contributing to the maintenance of public order, 2. ... promoted accurate land registration and increased revenues, 3. clarified land tenure, thereby insuring security in land transactions and stabilizing financial investments. In short, these measures were calculated to lure Japanese capital into Taiwan, offering Japanese capitalists security in their investments. Therefore, they may be regarded as ... the groundwork for Japan's economic conquest of Taiwan." Ch'en, op. cit. p. 47 (in Chinese).
- 15/ By 1915 some 920,000 hectares had been thus appropriated. Ibid., p. 46.
- 16/ Takekoshi, op. cit., p. 140. Since subsidies from Japan and bond sales also accounted for 40 per cent of the total revenue, the monopolies provided two-thirds of the revenue from domestic sources in 1903.
- 17/ Okamatsu, Santaro, Provisional Report on Investigations of Laws and Customs in the Island of Formosa (Kobe: Kobe Herald, 1902).
- 18/ Hoko is the Japanese pronunciation of the characters pronounced pao-chia in Chinese. The Japanese argued that their adoption of the hoko system indicated their desire to convince the islanders of the Japanese respect for indigenous institutions, but it is interesting to note that the whole concept of extended families and groups of families as units of social organization is also familiar and widespread in Japanese society.
- 19/ Within the hoko system also was found the so-called soteidan, or youth corps, composed of young men trained by the local police and used during times of flood and fire, or as an auxiliary to the police. The expenses attendant upon this organization, and indeed the entire hoko system, were paid for by the individual ko and ho. The Japanese did not contribute to the support of this "grass roots" organization except under exceptional circumstances.
- 20/ It is reported that in 1930 only 10 per cent of the Chinese aborigines on the island knew Japanese. This may well have been true with regard to the written language, but on the whole spoken Japanese was widespread and showed signs of replacing the native dialects as a lingua franca for all peoples on the island.
- 21/ Taiwan Keizai Nempo, 1943, p. 385.

- 22/ The associations were strongly influenced by the Taiwan Industrial Association Society, established in 1923, which was a government agency designed to encourage the establishment of and orient the activities of the kumiai, Ibid., p. 252.
- 23/ The largest coal-mining company in Taiwan was the Kiirun Tanko K.K., a subsidiary of Mitsui and Gan, two of the Zaibatsu. Mitsui also controlled the distribution rights to the coal produced by the Taiyo Kogyo K.K., the next largest producer, thereby dominating the marketing of Taiwan coal. The Gan family, moreover, controlled Taiyo Kogyo, which was also the second largest gold producer on the island. Cooperative investment by the Zaibatsu was not unusual, as in the case of the Japan Aluminum Co. plant built at Takao with capital from Mitsui, Mitsubishi, Sumitomo, Yasuda, and Furukawa interests. These examples indicate the intricacy of the relationships among the Zaibatsu and their Taiwan subsidiaries. Their investment and reinvestment in Taiwan was stimulated by the government's acceptance and abetment of their monopolistic control of industry.
- 24/ U. S. Navy, op. cit., Economic Supplement, p. 119. Total revenue does not include a surplus carried over from the preceding year.
- 25/ Although the Japanese dominated the foreign trade in which profits were large, Chinese entrepreneurs dominated the internal trade of the island. Only 43 per cent of the private capital invested in commerce was under direct Japanese control; the balance represented most of the Chinese investment in the non-agricultural economy. Capital in commerce amounted to about 20 per cent of the total private investment in Taiwan.
- 26/ U. S. Navy, op. cit., Taiwan Province, p. 6. Water in the Chia-nan area, for example, was rationed, since there was not a sufficient supply of water for two crops of rice each year on each piece of land. This situation lent itself to control of crops, and a 3-year crop rotation was enforced, which compelled the cultivation of sugar cane as well as rice. The government also used taxation as a means of encouraging cane production by levying lower taxes on dry cultivated land, including cane lands whether they were irrigated or not, than on irrigated, or wet-rice lands.
- 27/ U. S. Navy. op. cit., Taihoku Province, pp. 22-5.
- 28/ Ibid., pp. 78 ff.
- 29/ The active participation of the government in economic development is indicated not only by these examples, but also by items selected from the 1940 budget. These included funds for developing fuel resources, for encouraging change of fuel for motors and stock farming, for improving general and industrial conditions in the Pescadores; for railway improvements, for construction and improvement of telegraph and telephone facilities, for subsidizing shipping; for port construction at Gosei; for city planning; for encouraging the cultivation of hemp and the planting of special crops on irrigated rice land. In the previous year's budget similar items appeared, plus such others for the establishment of an Industrial Research Institute, and for the exploration of fishing grounds in the South China Sea.

IV. PROBLEMS, METHODS, AND PROSPECTS FOR DEVELOPMENT

Major changes have occurred in the Formosan economy since the beginning of the Japanese occupation. The agricultural frontier has disappeared. The most easily accessible resources have been exploited to a greater or lesser degree, and an expanded economy already has been developed. This economy not only developed, however, along restricted colonial lines, but it in some respects still exhibits the lethargic inflexibility of what has been called the "overdeveloped" type of Oriental economy. ¹/ Despite, and to some extent because of, these difficulties, the immediate developmental problem in Taiwan is not to open up new resources to exploitation, although this is a desirable subsidiary goal insofar as it is possible, but rather to increase the productivity of the existing structure by raising the efficiency of productive methods and altering the balance of the existing productive elements. It is, then, much more similar to that facing the relatively overpopulated areas of the colonial Asian world than it was at the turn of the century when Taiwan seemed likely to become an oasis of surplus in a generally deficit or marginal regional setting.

The long-run problem also has come to resemble that of other Oriental economies, although its solution may not be so pressing. The increasing man-land ratio will, within a score of years, begin to reflect itself in rapidly diminishing surpluses above what is already no generous level of living. That a complete reallocation of all economic resources will be necessary is certain. That industrialization, within which an increasing population can contribute to the "national" well-being, must begin to accelerate more rapidly, as the period of agricultural surpluses runs out, also is clear.

At the close of the war, in 1945, the Formosan economy was in chaos. ⁷ Transportation and power systems were operating at lowest efficiency; commercial fertilizers were scarce, and their sources of supply had been cut off; irrigation facilities had been allowed to deteriorate; the small army of Japanese industrial and agricultural technicians had been repatriated. Furthermore, the cohesive administrative system which held the economy together had disintegrated, and in its place appeared an amorphous mass of bureaucrats, legitimate businessmen, and profiteers. The life-blood of the organism, its working capital, had vanished with the swift inflation that consumed savings voraciously and with a return to a near-barter condition rather than a monetary system of exchange.

⁶ On the other hand, the end of the Japanese occupation by no means resulted in the total destruction of the basic framework within which development under the Japanese had taken place. ⁶ The land was still there with its soil resources and water; forests and minerals remained relatively intact and open to exploitation. ⁶ More important, despite the bombings and deterioration of service facilities during and immediately after the war, there remained a basic physical plant which had been constructed by the Japanese and which, on rehabilitation, could provide the essential stepping stone from which further development might take place. A railway system was operational; roads though deteriorated were usable; an electrical power system was in existence; basic port installations also were usable, though with difficulty; communications were operational in skeletal form, and so on. ⁶

The first step, then, has been the rehabilitation of this physical plant and the services which it provides. As a result of the concerted efforts of the Chinese Nationalist government, these services, after a very slow start and with some external aid, are now operating (in 1953) at levels approximating and in some cases exceeding those reached under the Japanese. Communications, transportation facilities, and the power system are operating at or above levels of efficiency established under the Japanese. 2/ Port facilities also have been greatly improved. Yet, increased population, restricted markets, and the high-costs of raw materials (whether for agriculture or industry) all call for greatly increased service facilities and operational efficiency.

Agricultural Development

It is clear that the short-run economic development of Taiwan will depend in large part upon the expanded utilization of her agricultural resources, already the most developed segment of the economic structure. The island is fortunate in that it produces more than enough food to feed even its now swollen population. Upon a surplus, however, will depend its ability, apart from outside aid, to bring into the economy those necessities which will break the "vicious circle" into which so many of the other overpopulated, underdeveloped areas seem to have fallen. Agriculture, then, seems the logical point of departure for all development schemes.

The outlook for the future, however, indicates decreasing agricultural surpluses in terms of gross output, although in special sectors of agriculture rapid gains may be possible. The problem, of course, will not be merely to supply an rapidly increasing population with its food, but to increase production enough to make large surpluses available for export. About 75 per cent of Taiwan's exports in 1952 consisted of sugar, but sugar output has declined substantially since the prewar period, despite increases since the close of the war, and it appears unlikely that it will much exceed the 520,000 metric tons produced in 1951-2. Since this is less than half the Japanese production just before the war began, the decline is clearly of basic significance. Similarly the export trade in rice has failed to reach that of the prewar period; only 100,000 tons is estimated to have been exported in 1952 as compared with a high of 721,000 tons in 1934. 3/ Without increased exports of this kind there is little possibility of gaining the foreign exchange with which to purchase commercial fertilizers and bean cake so vital to the maintenance and increase of agricultural production. Since increased sugar production is unlikely, this does not mean necessarily that rice becomes a more critical focus, but there are other crops for which export possibilities exist -- pineapples, bananas, citrus fruits, vegetables, and in an adjacent sphere fish. At the same time, the by-products of the sugar industry also may, given markets, provide exports, as in the case of alcohol before the war, and the yeast and paper pulp and fiberboard from bagasse will, as technical difficulties are overcome, contribute to the supply of domestically supplied necessities.

In agriculture the two main lines of endeavor are to maintain and expand the areas under production and to increase yields. The maintenance and expansion of the agricultural area demands an intensive program of soil and water conservation. The slopes of Taiwan's hills and mountains are plastered with rectangular patches of fire-cleared land, in sweet potatoes, bananas, and vegetables from which the soil is washed out at an alarming rate,

thus contributing to the flooding and silting of the fertile river valleys downstream. Control of this form of land clearance and agriculture has still to be established, and the Forestry Bureau has no power as yet to prevent the alienation of "certain areas within the national forests and to lease them for agricultural purposes." 4/ That the reforestation program needed will remove a certain amount of land in agricultural use is admitted, but it is in most cases marginally productive land and in time the protection of watersheds will repay the temporary loss in food production many times over, as the more valuable bottomlands downstream are spared destruction from floods and silting. In this respect, very little has yet been accomplished since the end of the war.

Since the seasonal water shortages especially in the southwest are so important, the exploration and exploitation of ground water resources in that region are necessary so that water may be brought to the few areas not now cultivated, or those much greater areas which lie fallow during the dry season or are characterized by low productivity. The utilization of ground-water resources is at a minimum stage still, although the Taiwan Sugar Corporation has been drilling wells on its properties. Improved water storage facilities, again especially in the southwest, also are extremely desirable. The major difficulty is to find suitable dam sites away from already occupied agricultural land which would be submerged by the reservoir waters. Similar problems are common in Japan.

Any large additions to arable land would demand extensive reclamation along the shallow western coast and the increased terracing of steeper and steeper slopes. In both cases the costs involved are inordinately high. By far the greatest amount of economically suitable land has long since been brought under the plow, and the total amount of land under cultivation has remained more or less constant for about 15 years.

The possibilities for increasing crop yields, however, offer greater encouragement. Water control and drainage often will permit two crops each year to be grown where one grew before. Technical aid in the form of better seeds, tools, and general farming techniques can be supplied to replace the Japanese technicians and agricultural extension services which identified Taiwan's earlier agricultural development. New crops can be introduced and more efficient rotation systems developed, even though established agricultural practices are soundly based upon long experience. Basic among these problems is that of fertilizer supply. In this regard the increased use of green manure crops, as advocated by the Japanese during the war, and the improved utilization of compost can be encouraged.

The agency most significant in the promotion of a more scientific and productive agriculture is the Joint Commission for Rural Reconstruction, which was set up in October 1948 as a jointly administered Sino-American body supported with ECA funds, the job of which was to assist in the reconstruction and rehabilitation of rural areas in China. 5/ JCRR works closely with the Department of Agriculture and Forestry and other interested government agencies and with the Farmer's Associations which have replaced those formerly organized under Japanese control. JCRR budgets have been modest; less than U.S. \$10 million have been spent during the life of the agency, but the scope of its interests and influence have been wide. In collaboration with ECA (later MSA) and government officials it has acted to improve the use of composts and green manures; to advise and assist in the irrigation and draining of arable lands; to encourage the production and distribution

of better seeds and simple agricultural tools; to establish a system of insect and disease control; to advise on problems of the storage and distribution of foodstuffs; to advise and assist in the course of programs of rent and land reform; to supervise the distribution and encourage the use of fertilizers imported with MSA funds. In effect, JCRR has taken over a substantial share of the functions which the Japanese had performed for Formosan agriculture with remarkable results for so small an organization, as evidenced by rapid increases in the number of swine and increased crop yields.

The fertilizer problem has been dealt with thus far in two ways; by the importation of fertilizers chiefly from Japan and by the rapid expansion of fertilizer production in Taiwan itself, as described above. In both cases American economic aid has played a major role and JCRR, also in a limited sense an American instrument, has assisted in the distribution of fertilizer supplies. 6/ The supply of fertilizers still is below that available under the Japanese but the gap is closing. Domestic production has risen, with further increases projected and likely. 7/

Mechanization may offer some opportunities for increasing yields, but there is little evidence that it will, as is sometimes maintained, act as the panacea for Taiwan's agricultural ills. In fact, it may well result in at least temporary declines in productivity, although at the same time it will make more efficient use of labor. In Taiwan mechanization has been restricted largely to the lands of the Taiwan Sugar Corporation where deep plowing has been done with tractors, to the pumping of water in the larger irrigation areas, and to the threshing and milling of paddy. In most of the island, however, the topographic barriers to mechanization in the fields are considerable, and the size of the fields themselves, levelled as they must be for irrigation purposes, militates against the use of machines. Furthermore, the investment demanded of the farmer by mechanization is far beyond his means, and the maintenance of machinery, even under cooperative conditions, has yet to be proved possible. In any case, the water buffalo's comparative advantage over the tractor lies in its contribution of manure to the fertilizer supply, its provision of meat and a hide upon its death, its dependence largely upon farm-produced wastes, its provision of a successor in the form of a calf, and in the puddling of the paddy fields as it pulls the plow or harrow.

The cultural barriers to mechanization are several. First, double-cropping and inter-tillage practices present problems which machines have not yet been developed to solve. Further, there is little evidence that mechanization actually can increase yields of rice, most productive per unit area of the cereals (indeed, rice yields in Japan are half again as great as those in the mechanized rice areas of Louisiana). Lastly, the use of machinery must result in the displacement of a sizeable number of persons from the rural labor force, already lacking enough to occupy it productively the year around. But how long would the period of displacement and insecurity last?

Land Reform and Agricultural Organization

Another major problem has been that of raising the Taiwan farmer's personal incentives to produce, as has been true elsewhere in Asia. Sufficient inducements, it is assumed, will result in a more stable countryside and in greater opportunities for political progress. Early in their

occupation of the island the Japanese had introduced a limited land reform which established the pattern of occupancy that existed to 1949, and later in their period of control they regulated leasing procedures and in effect promulgated rent control regulations. After the war, however, the power of the landlords increased enormously, debt became an increasingly significant factor in the countryside, and the economic plight of the 67 per cent of the farming families who were tenants became ever more serious.

The pressing need for solution of this problem resulted in the institution of a program of land reform by the Taiwan Provincial Government in April, 1949 with the advice and under the tutelage of JCRR. The basis of this program was rent control, and rents, which had run as high as 70 per cent of the main crop, were to be restricted to 37.5 per cent. This meant a saving to the average farmer of some 750 kilograms of rice a year, and the difference between a very modest livelihood and a marginal subsistence. Also, a standard contractual form was adopted, the tenant was assured a minimum tenure of three years, and landlords were forbidden to collect rentals in advance.

The consequences of this reform were immediate and mixed. 8/ In general the response was favorable, but implementation of the program was inadequately supervised by the Land Bureau, and evasions of the regulations became common. At the same time, protests came from both landlords and tenants, especially the former, about the inaccuracy of the land classification system upon which the reform program was based. The 26-grade system in effect in Taiwan is based upon Japanese surveys of 1944, and it has been estimated by the Land Bureau that at least ten per cent of the arable land in Taiwan needs reclassification. To meet the immediate problem a program of land reclassification was initiated under JCRR auspices where conflict had arisen between landlord and tenant, and by the end of 1950 the number of complaints had declined substantially. Nevertheless, a general cadastral re-survey and reclassification of arable land is due, together with a complete land utilization survey and evaluation.

Meanwhile, the price of tenant-occupied land had fallen, a desirable end since it made it theoretically possible for tenants to buy the land they worked. However, though land was in fact sold rapidly, it was not sold to the tenants, who thereby lost their rights of tenure as the land changed ownership. Further, since the 1949 regulations were not a law but part of an executive directive, effective enforcement was lacking. As a result, in May, 1951 a Rent Reduction Law was passed which extended the tenure period from 3 to 6 years and made much more secure the tenant's position. Enforcement through a permanent section of the Land Bureau was established, and provisions for permanent land committees similar to those in Japan were adopted, although the formation of these local committees has been hampered by local ignorance and landlord opposition. Since the passing of the 1951 law, the program has been judged a success, although its significance for increased productivity is unclear. Also, as Ladejinsky points out, the fact that the program was imposed from above without a strong "grass roots" base may tend to lessen its effectiveness on morale. 9/

The next logical step for Taiwan from the standpoint of political and social stability would be a general land reform, and again with the aid of JCRR a two-part program has been initiated. The first part has been a cadastral survey, showing land ownership throughout the island. The program was proceeding in 1952, but had not been completed at the end of that

year. The second step has been a sales program of publicly owned land, 180,000 hectares of which came under government control when Japanese-owned land was confiscated at the end of the war. Of this amount, 122,000 hectares belonged to the Taiwan Sugar Corporation. In 1951, some 36,000 hectares of relatively poor land was put up for sale, most of which had been sold by the end of the year; the 1952 program called for the sale of some 64,000 hectares, almost half of which was better-grade land leased out by the Taiwan Sugar Corporation. No definite program for further land reform has yet been implemented. 19/

The results of these land reform measures cannot easily be determined. Although termed thus far successful, their advantages have been countered to a considerable extent by the price "disparity between farm and industrial products," and by the burden of taxation which for the first time has been placed upon the farmer tenant farmer.

Another major problem has been that of rural credit. Although the Japanese-originated banking structure was taken over with only seemingly minor modifications, the banks are playing a much less significant role in granting credit than are private moneylenders. A survey by JCRR in 1951 of 823 farmers showed 713 in debt and that the sources of loans in 73 per cent of the cases were usurers as compared with less than 50 per cent in 1933. Generally the loans are short-term loans with a modal interest rate of ten to fifteen per cent. Part of the credit needs of the farmer, however, is met by the barter arrangements of the Food Bureau and JCRR, but the need for rural credit reform has yet to be satisfied.

The organization of Formosan agriculture was badly shaken following the end of Japanese rule. It has yet to recover from that blow, although progress has been considerable in spite of it. The core of the prewar organization was composed of the various associations of farmers, as noted in the previous section. At the beginning of the reoccupation of the island the associations had deteriorated in many instances to a point of disintegration. After being shifted about from the supervision of one government agency to another, in February, 1949 an amalgamation of the various agricultural associations and cooperatives was ordered, and the new Farmer's Associations were placed under the direction of the Provincial Department of Agriculture and Forestry. Incompetence and inadequate supervision plus the general apathy in the countryside and the disinterest of landowners prevented the growth of well-integrated organizations which could serve the functions of farmers cooperatives, extension and educational services, and credit agencies. Therefore, on the recommendation of JCRR a Farmer's Organization Division was established in the Department of Agriculture and Forestry, and measures have been adopted to improve and strengthen the associations in a democratic fashion at the various levels of organization. Both increased personnel training and more financial assistance are recommended for the Farmer's Associations, if they are to provide a means by which government agricultural policies can be implemented. Although the local governments nominally supervise the functions of the associations, the real relations between official agencies and the associations remains unsystematic and unclear.

Government control over agriculture has been more effective in other spheres than the associations, although not to the same extent as under the Japanese. That this is so is in part an indication of more democratic procedures at work under the present government, although it would be naive

to assume that elective processes in the Farmer's Associations for example have yet greatly diminished the influence of landlords in the rural areas.

One of the major government controls operates through its control of certain major irrigation systems (as was true under the Japanese) by water utilization associations directed by the Provincial Water Conservancy Bureau. At the same time, loans issued by JCRR to the water utilization associations have lessened a dependency on both government and private banks, although in many cases because of a lack of skilled personnel in the associations, the Water Conservancy Bureau has directed the expenditure of these loan funds. Another major government control has been exercised through the government ownership of the Taiwan Sugar Corporation which dominates the sugar scene, cultivates some 49,000 acres of its own, leases almost an equivalent amount of land to tenants, and contracts with those farmers, especially in the controlled irrigation areas of the southwest, for their cane crops.

The government also controls directly about 30 per cent of the annual rice harvest, 460,000 metric tons in 1951, through its fertilizer barter program and its agricultural taxation policies. Under the former program, the Food Bureau distributes fertilizer through the Farmer's Associations in exchange for given quantities of rice. In some cases the farmer is advanced his fertilizer on a loan basis for repayment in rice after harvest. This procedure also assists in allocating relatively scarce fertilizer to certain crops, until now chiefly rice and secondarily sugar cane. The Food Bureau also collects ~~three kinds of taxes in rice from landowners~~: a land tax, a surtax, and a defense tax. In addition, landowners are compelled to sell certain quantities of rice to the Bureau at prices at or below the market rate. The government rice stock "has been used largely for rationing to the military forces, the police, civil servants, and public school staffs, for emergency reserve stock, for stabilizing the market price of rice, and for export." 11/

What cannot be done by coercion, then, under the present regime, must be done by persuasion, but it appears that the persuasive techniques are poorly developed. As the Farmer's Associations are strengthened, this problem may well diminish, but increased collaboration between government agricultural agencies, the National University and agricultural schools, and the farmer will still be necessary if the contributions of the farmer to raising agricultural productivity are to be maximized.

General Developmental Policy

In December, 1952 MSA announced the transmission of a four-year development plan under which Taiwan would "become self-supporting." Some sort of plan has been sorely needed, since until the end of 1952 at least a clear course of development had yet to be made explicit. Unfortunately, the nature of this plan in February, 1953 was obscured by its security classification. From the programs that have been pursued thus far, however, it appears that the major emphases thus far have been three: agricultural development, including industrial development directly related to agriculture; rehabilitation and expansion of the basic service industries; the development of certain consumers goods industries the products of which have ranked high in the import schedules.

The agricultural program outlined above emphasizes the rehabilitation of agriculture along lines which in a general way have resembled those laid

down by the Japanese. The major difference has been a relative de-emphasis on sugar production, partially due to circumstances beyond the control of the government. The major project has been to raise yields (especially of rice) and to raise the yields of other crops approximately to pre-war levels. The success of this program has been noteworthy, and it is expected that so long as current trends persist, yields within a year or two will begin to match those of fifteen years ago. Major progress has been made in the production of fertilizer on the island itself, although claims to near-future self-sufficiency in fertilizers seem at this time to be unduly optimistic. Certainly the population of the island, despite its great increase in size, is as well fed on the whole as it has ever been, but the surpluses available for export are substantially below what they were before.

Along with the emphasis on agriculture there has been a program for developing a basic service industries on the physical foundations and plans laid by the Japanese. The rehabilitation of the power industry and of transport and communications facilities have been remarkable. Metal-refining industries have been de-emphasized, and a number of the facilities thus used by the Japanese have been or will be turned over to fertilizer production.

At the same time, the government has encouraged the development of a cotton textile industry in order to lessen the dependence of the island on imported textiles, the major import item in both the pre-war and post-war periods. It is not inconceivable that within four years it will be possible to satisfy minimum requirements for cotton textiles from domestic mills, although the raw materials must continue to be imported. Also, the gradually increasing supplies of electric power, despite immediate shortages, are making for substantially great local production of basic consumer's goods other than textiles.

This three-part program has proceeded with the complete participation of the government on all fronts, and government controls over imports and exports have been rigidly effective. To an overwhelming degree the government is the dominant export-import agency, and the role of private enterprise in international trade has been small. In fact, apart from agriculture, the government has acted as the chief entrepreneurial agent in Taiwan; and most of the very large Japanese industrial assets have been taken over and are now run by government bureaus. Wholly or largely government-owned industries include the following: power, railways, salt, alcohol, cement, caustic soda, coke, paper and pulp, textiles, tobacco, alcoholic beverages, communications, camphor, gunny bags, and fertilizers. The government corporation is as much a part of the post-war scene as the Government-Zaibatsu corporation was part of the pre-war picture.

The dividends from government monopolies or near-monopolies, however, are relatively small. In the absence of contradictory data it appears that only the Monopoly Bureau, which controls the production of tobacco and alcoholic beverages, shows a substantial profit. Under the Japanese, profits from monopolies and other government enterprises accounted for over a third of the normal government revenue. In 1950 monopoly profits accounted for 18 per cent of the central and provincial government revenues; in 1951 they reached 22.4 per cent. On the other hand the governments are much more dependent on taxes than was the Japanese Government-General. In 1950 taxes accounted for 47 per cent of the revenues to the twin governments and all of the revenues for local governments; in 1951 the figure was about 45 per cent,

as compared with twenty per cent during the immediate pre-war period. Customs duties accounted for 31 per cent of the central and provincial government revenues in 1951 (a substantial increase over the pre-war percentages). However, the total amount of foreign trade in absolute as well as relative terms has remained depressed. The export surpluses which made Taiwan so valuable in the Japanese imperial economy are no longer significant, and in 1951, apart from MSA purchases and materiel for the armed forces, there was a substantial surplus of imports over exports. If rice exports can be increased in the near future as production increases and government stock-piling declines, the export and import values should balance, but a generous export surplus seems unlikely, even in the short run. Since government reserves of gold have either diminished or are earmarked for the armed forces, the domestic financial resources available for economic development appear to be very slight. There is little private capital on the island. Not much is being accumulated through private enterprise, under the threat of even moderate inflation and the government itself is barely able to finance its minimum requirements. 12/

Under these circumstances, it is clear that at best the achievements of the past four years have been in the nature of a holding operation against disintegration and possible economic collapse. It also becomes difficult to judge the effectiveness of the proposed "four-year plan", except for two descriptive sentences: "The plan outlines steps for achieving these goals in conjunction with effective use of American economic aid.", and also, "the plan contemplates American dollar aid in annually decreasing amounts." What, then, is the nature of American aid and how effective has it been and does it appear to be for future development?

The U. S. Aid Program

The MCA-MSA program in Taiwan was designed to assist the government in maintaining its economic existence through financial aid and technical assistance. Until 1950, the program was simply one of assisting in the distribution of commodities which had been moved from the Chinese mainland before the Communist victory and in aiding the rehabilitation of communications and other utilities on a relatively small scale. The contract of the Chinese government with the engineering consultant firm of J. G. White Company was financed in this manner. From 1950 on, however, the program became much more comprehensive, and its basis became the procurement of such imports as were necessary to satisfy basic consumer needs and to aid in the reconstruction of utilities and communications and the general rehabilitation of agriculture and industry.

In the first half of 1950, \$11.7 million dollars (of which \$8.1 millions were appropriated U. S. funds and the balance came from commodity sales) were used for the above purposes. The 1950-51 fiscal year program envisaged more substantial and longer-term operations, and about \$93 millions were budgeted from Congressionally allotted funds. In 1951-2, about \$81 millions were budgeted of which all but \$1.4 millions were allocated for basic supplies and equipment, especially foodstuffs, fertilizers, and industrial raw materials. In this year for the first time supplies and equipment for the common-use of the civilian and military aspects of the economy were included.

The utility of American dollar aid has been substantially increased by the use of "counterpart funds," local currencies deposited by the receiving

government equal in value to the aid commodities supplied and paid for from the U.S. dollar aid grants. Although the system in detail is a complicated one, with numerous special cases and exceptions, the counterpart funds have been used to maintain JCRR, to pay for the administrative expenses of MSA and its elusive Chinese sister organization, the Council for U. S. Aid (CUSA), and the like. Major expenditures have also been made from counterpart funds for agricultural and public works development.

Despite the virtual impossibility of evaluating the aid program in detail, it seems likely that without it the government on Taiwan would have faced almost impossible economic and political difficulties in view of its heavy military and administrative expenditures. But for this aid, the likelihood of internal dissension in the light of events on the Chinese mainland would have been greatly increased. The approximately \$190 million in economic aid which the United States has expended since 1949 in Taiwan may well be said to have accomplished its limited purpose. The agricultural economy has been partially revitalized, power, communications, and transport facilities have been rehabilitated or expanded, and a material basis for future industrialization seems to have been established.

Even on the basis of limited information, however, some questions must be raised about the aid program as it was conceived and applied. In effect the capital granted as aid has been roughly the equivalent of the Japanese-originated capital which was injected into Taiwan's economic development. One chief question, then, is whether the capital injections have been at the heart of the development problem. It seems reasonable to give a generally affirmative answer. Apart from foodstuffs for immediate consumption, emphasis in the procurement program has been on purchases of commodities such as fertilizers which support agricultural productivity and on equipment for rehabilitation of public utilities. On the other hand, it also appears that the aid program has been operating without a coherent development plan either of Chinese or American origin. It has been ad hoc and distinctly short-run in character. This is not strange in view of the unsettled political setting in which the program has until recently been operating, but it undoubtedly has resulted in some inefficiency in the use of capital resources. At the time of writing, natural resource evaluation and explanation are hardly out of the talking stage. Study of the organization of Taiwan society has barely been attempted, and a comprehensive analysis of land-holding and occupational distribution from which developmental planning can proceed has yet to be made. Statistical information is limited and often contradictory, and facilities for improving their collection and interpretation are also limited. The administrative apparatus for development is clumsy, primarily on the Chinese side, and it was only in 1953 that an attempt to rationalize the complex relations between MSA and its associated agencies and their Chinese equivalents was made. Many of these problems arise inevitably from the overall relations between the two countries but their long-run significance should be recognized.

Without the aid program, could Taiwan have survived economically, assuming that American naval protection eliminated the possibility of Chinese Communist invasion? It seems possible that it could have, although recovery would have been painfully slow and resultant unrest would undoubtedly have made the position of the incumbent government a hazardous one. Also, such recovery would have depended in part on a drastic diversion of emphasis from military to civilian problems. On the other hand, would less U. S. financial aid have accomplished substantial good? Almost certainly yes. The most

effective single agency operating in Taiwan within the past four years has been JCRR whose total budget has been only a small fraction of total expenditures. Of course, the effectiveness of JCRR has been in part due to the commodities purchased with MSA funds, especially fertilizers, which made many basic agricultural gains possible. Even here, it can be maintained that less aid (~~say in fertilizers and~~ crucially needed foodstuffs) would still have permitted rehabilitation, if at a slower pace than has been possible thus far. Certainly, the use of Japanese technicians, though perhaps embarrassing to the Chinese government, might well have been as effective as and far cheaper than their American equivalents. Another important factor, however, has been that the United States Government procurement agencies could purchase for Taiwan desired imports which were in short supply on the world market. It is a moot question whether Taiwan, even with foreign exchange gained from agricultural exports and reserves, could have bought freely and effectively in the world market without American assistance.

The final question is laden with an infinite number of variables. Has there been sufficient aid from the United States? Aid for what? For the rehabilitation of the former Japanese-developed economy? Basically, yes. Aid has been more than adequate, and rehabilitation has been extended within the past few months to expansion on a small scale. It is recognized by MSA officials that the restoration stage is over and that a new stage is about to be initiated.

However, is the program, on its past and contemplated future scale, adequate to initiate in Formosa a self-generating developmental process which will enable the island to retain its political integrity on a viable economic foundation? Unfortunately, the answer must be no.

Rapid economic development, of a sort that leads to increasingly efficient resource utilization and constantly regenerated investment demands a rapid training of skilled workers; it demands a thorough knowledge and highly skilled exploitation of a substantial resource base; it demands rapidly increasing agricultural productivity, so rapid that the pressure of population on the food supplies relative to the gains; it demands an organization of society into a sensitive and integrated instrument of governmental policy, especially where the government, as in the case of Meiji Japan, must (because of limited physical resources, lack of fluid capital, or cultural conservatism) act as the chief promoter of development; it demands above all an abundance of capital, howsoever obtained, from export surpluses, from crushing taxes on the peasantry, or from outside sources in the form of private investments, loans, or gifts.

None of these conditions are satisfactorily evident in Taiwan today. One most obvious weakness, of course, is the lack of fluid capital. The United States has provided a substantial part of this capital since 1950 during what was clearly a "holding" stage. If rapid economic expansion is to take place, especially with a minimum of internal friction and dissension (and without injecting into the productive structure the unemployed military personnel, whose numbers are almost a quarter of the present labor force) an enormous inflow of capital is clearly required. There is an unquestioned need for vastly increased American or other external aid, if Taiwan is really to serve as "a model for the economic development of other nations of South Asia." 13/

FOOTNOTES TO CHAPTER IV.

- 1/ For a discussion of this concept see, McKim Marriott, "Technological Change in Overdeveloped Rural Areas," Economic Development and Cultural Change, Number 4, December 1952, pp. 261-72.
- 2/ In the case of railways, for example, ton-kilometers of freight carried (925 millions) was higher than in 1940 and reports for 1952 indicate a higher figure than the record of 1,127 millions in 1943.
- 3/ Even so, the extent of surplus is remarkable when it is recalled that there was a net import of rice in 1950.
- 4/ Gill, op. cit., p. 7.
- 5/ See the ECA pamphlet, The Program of the Joint Commission on Rural Reconstruction in China, 1950.
- 6/ The fertilizer problem is complicated by the inflexibility of farmers' attitude towards the use of fertilizers or by their inefficient use of new kinds. JCRR reports that "some fertilizers such as calcium cyanamide and calcium superphosphate ... are still reluctantly accepted by the farmers. ... Demonstration is imperative to educate farmers to use these fertilizers and to increase the consumption." JCRR, General Report II, 1952, p. 15. The farmers also are unaccustomed to the use of unmixed fertilizers, the state in which most MSA fertilizers are imported.
- 7/ It is proposed to convert the former Japanese aluminum plant at Hua-lien, now in disuse and disrepair, to the production of ammonium sulphate. A urea-producing plant near the northern coal fields also is projected, upon the completion of which the island will become self-sufficient in nitrogenous fertilizers. This is distinctly a long-term project, however. See V. S. de Beausset, "Present and Future Development of the Nitrogenous Fertilizer Industry in Taiwan," Chinese-American Economic Cooperation, April 1952, pp. 69-70.
- 8/ A thorough discussion of the land reform program is given in JCRR, General Report II, Chapter VI.
- 9/ W. I. Ladejinsky, "Land Reform in Formosa," Foreign Agriculture, June 1950.
- 10/ However, tentative proposals indicate a plan whereby landlords will "sell" to the government all but 1.5-6 hectares of paddy land or 3-12 hectares of dry land, in return for government bonds and stocks equaling 2.5 times the annual value of the main crop. The plan bears remarkable resemblance to that of the Japanese in 1906.
- 11/ Shen, op. cit., p. 266.
- 12/ "Total government revenue, including special taxes, sales of 'patriotic bonds', and other income, met only one-half of government expenditures." ECA, U. S. Economic Assistance to Formosa, (Washington, 1951), p. 5.
- 13/ Logan, op. cit., p. 15.

EPILOGUE

(As of August 7, 1953)

The trends toward higher production levels in Taiwan described in the earlier portions of this paper continued during the first half of 1953. In almost every agricultural sector, major increases in crop production have been attained, and even sugar production, for the first time, is beginning to approach the prewar levels of production. In industrial terms as well, similar progress is being recorded. The production of electricity, fertilizers, cement, and a variety of other key industrial commodities is steadily increasing. (Tables A and B).

There is evidence also that the interim reconstructionist character of the development programs, both U.S. and Chinese, to date is beginning to change and the work is assuming a new and longer-run aspect. Under MSA auspices a thorough examination of the nature and patterns of the island's resource base is being made. Also under MSA auspices, a socio-economic survey of the island has been initiated and its preliminary results are to be published. This should partially fill the void in sociological data which hampers any attempt at understanding the problems which face Formosan society.

At the same time, the Chinese government is giving fresh evidence of its sincerity in attempting to make Taiwan a model social, if not political, unit in Asia. Of primary importance is the passing of the so-called "Land-to-the Tiller Act" promulgated on 26 January, 1953. This act represents the beginning of the third step in the island's land reform program, of which the first two steps consisted of (1) rent reform and associated regulation of tenure and tenant-landlord relationships and (2) the sale of government-owned land to the public on a controlled basis. The first of these two steps has been completed. The second is still dragging; at the end of 1952 only 54,000 out of 165,000 hectares designated had been sold, partly because much of the land available is low-grade and therefore undesirable for intensive wet-rice farming. The third stage is just beginning, and its implementation will depend upon the completion of the resurvey and reclassification of agricultural land referred to previously.

In general the Land-to-the-Tiller Act resembles the land reform measures promulgated and implemented in Japan during the occupation and recommended in South Korea. In brief, no person (other than government corporations) is to be permitted to own more than 3 chia (one chia equals .97 hectares) of paddy land classified between the 7th and 12th grades in the land classification system. This means that larger amounts of poorer land can be owned and operated, and that only smaller amounts of the highest grade paddy can be owned by one person. The proportions between the various grades of paddy and dry fields have been worked out and are incorporated in the act. A ten per cent leeway in either direction from the prescribed ratio is authorized, as conditions of soils, drainage, and surface configuration vary. Final decisions as to who keeps what and who gets what are to be made by the existing Township and Hsien Government Land Commissions.

Land over the prescribed limits is to be purchased by the government and paid for in so-called land bonds, to be issued and administered by the

Land Bank, and in shares in government enterprises on a 70-30 per cent basis. The purchase price is set at 2.5 times the value of the total annual main crop yield as determined by the land grade. It will be sold to the present tenant, if he applies for the privilege, who will pay the same price for the land, plus four per cent interest in a series of 20 semi-annual payments in kind. The limits of the annual payments are set within the 37.5 percent of the main crop now established under the rent control legislation.

The new law has yet to be enforced. However, the possibilities for successful application of the act appear to be increased by the previously successful implementation of the rent control legislation, which also depended upon the Land Commissions. Yet there are certain to be difficulties. As in the case of Japan, the position of the landlords on the Land Commissions is strong, and their influence can be expected to restrict the full implementation of the project. Since land for "growing necessary raw materials" is exempted from government purchase and redistribution, control of valuable forest and firewood lands associated with farmlands may stay in the hands of the present proprietors, as has been the case in Japan. On the other hand, the act calls for the purchase of such auxiliary properties occupied by houses, drying grounds, shelters, trees, etc., as may be associated with given units of farm land.

In all, some 180,000 hectares are involved, amounting to 20 per cent of the total cultivated area of the island. Some 250,000 - 300,000 tenants and farm laborers will be directly affected, 39-47 per cent of the total farm families on the island. Once the land transfers are completed, 79 per cent of all the cultivated land will be in the hands of owners. Of the remaining 21 per cent, 12.1 per cent will remain in the hands of government enterprises, of which the Taiwan Sugar Corporation is the most important. The consequence will be a redistribution of land ownership and a major realignment of the land tenure pattern in Taiwan, but in terms of the size and pattern of producing units, there will be relatively little change.

Another government endeavor has been the strengthening of the farmers' associations. The Farmers' Organization Division of the Provincial Department of Agriculture and Forestry, in collaboration with JCRR, has pursued a policy of increasing control over the local associations down to the Small Agricultural Units, the bases of the system. Improved accounting systems which will permit greater control over association operations and periodic meetings among the heads of certain of the middle-level associations have been encouraged. 1/

In spite of the progress in agricultural organization and training and in actual output of both agriculture and industry, there is serious doubt as to whether these gains are rapid enough to compensate for the population increase. From an estimated figure of 9.2 millions in late 1951 it seems probable that the total population will have grown to over 9.9 millions by the end of 1953. At best, it appears that the economic gains provide only a slight margin of safety. An ominous sign was the acute shortage of rice on the domestic market in the Spring of 1953; exports were prohibited after April 1st. Furthermore, domestic rice prices have risen sharply, 35 per cent in 1952 alone.

In 1952 there was again an excess of imports (including MSA-financed imports) over exports. But the MSA-financed imports almost equalled all

other imports. An analysis of the national and provincial budget expenditures in 1952 reveal that that year 53 per cent of all expenditures in the net provincial and national budgets went for military purposes and another 6 per cent for police and general security measures. Only 18 per cent was spent for economic development purposes.

Although it is fair to point out that this military burden is no more than that of a number of countries elsewhere, including the United States, nevertheless Taiwan can much less well afford a burden of these dimensions. Its significance is even more apparent when it is observed that 80 per cent of the national budget, exclusive of provincial expenditures, was allocated in 1952 to national defense. The fact that some 600,000 men are not gainfully employed (as members of the armed forces) and that these account for 12.5 per cent of the total male population, provides some indication of the special burdens imposed upon Taiwan's hard-pressed economy. The total annual rice consumption of the troops, excluding dependents, is estimated at between 200,000 and 220,000 metric tons, or about 14 per cent of Taiwan's rice production.

There is little question that MSA assistance has been the dominant fiscal factor in keeping the economic system viable. Not only did MSA-financed imports account for 45 per cent of Taiwan's gross imports in 1952, but they consisted for the most part of materials which could not have been purchased without hard currency, of which the government has perilously little. It is not inconceivable that some of the industrial producer-goods imported from the United States could have been obtained from Japan on a barter basis, but most of the fertilizers, and fertilizer raw materials, edible oils, and special foodstuffs could not have come from Japan, and in any case the Japanese are anxious to tie in large quantities of consumers goods with their producer-goods exports.

The significance of MSA aid is indicated also by the fact that counterpart funds allocated directly to the government accounted for nearly 12 per cent of the total 1952 expenditures of the combined provincial and national governments. In addition, direct assistance and all counterpart funds provided over 25 per cent of the total local currency requirements of the government.

In the 1952 fiscal year about two-thirds of the MSA aid was spent for the purchase of critically needed commodities, chiefly fertilizers, foodstuffs, and other raw materials which are necessary to the maintenance of the present rate of economic development. In addition, nearly 16 per cent went for capital development goods with which to rehabilitate and expand industrial activities. To a large degree such projects as the expansion of the power system, the construction of the Hsi-lo highway bridge across the Cho-shui river and the rehabilitation and expansion of port facilities, railroads, and highway transportation facilities have depended upon this class of expenditures. Furthermore, 15.7 per cent of the expenditure went for common-use items, chiefly of military significance. Lastly, there were small expenditures for technical aid and health programs.

The chief difference between the 1952 budget and the allocations for the first half of the fiscal year 1953 is in the pattern of allocations. Of the \$66.2 millions made available for the first half-year (out of a proposed \$102.3 millions for the year) 27.5 per cent was spent for military support, as compared with 15.7 per cent the previous year. Instead of two-thirds being spent on commodity purchases, 57.5 per cent was spent, and in

the crucial sector of capital goods expenditure, only 14 per cent was spent. This allocation would suggest an unfortunate deflection of support from crucial economic developmental problems to military ones. If this trend continues, it may increase the possibility of failure in pursuing the long-run goals of making Taiwan a self-supporting economic entity.

The extent of American assistance and the key position it assumes in assessing the government's ability to maintain itself implies heavy pressure upon the government from the United States to pursue certain courses of an economic and military nature. No doubt these pressures do exist and are brought to bear in both direct and indirect ways. The withdrawal of American aid would mean a stagnation of the Taiwanese economy and in time a failure of the present government, burdened as it is by the military costs it must carry. It is true also that many of the specific suggestions for social and economic reform seem to have originated either in MSA itself or in JCRR.

Even so, it would be unwise to assume that change has been forced upon the Chinese ruling elite in Taiwan solely by the Americans. It is no doubt true that some changes have been imposed upon the Nationalist government, but they have been forced as much by external events in the Far East and the world as by American pressure. The Chinese government, as indicated by the remarks of numerous spokesmen, has indicated that it realizes the seriousness of its situation, that the influence of a China Lobby in the United States is not great enough to guarantee continuing assistance on a large scale, and that the slim chance of survival depends upon the creation of a model society which will present to the rest of Asia a demonstration of all the desirable characteristics which were lacking in the state ruled by the old Kuomintang and are absent also in Communist China today. The course of self-preservation clearly points to a need for what might be termed moral rearmament or at least reorganization, of which one sign is thorough-going land reform.

To a degree also there is a paradox in this aspect of the problem. Taiwan is heavily dependent upon American economic assistance, but such economic dependence is almost automatically interpreted in the rest of Asia as meaning political dependence as well. It seems clear that it would be in the best interests of the Chinese in Formosa to adopt a course of economic policy which will promote as much independence as possible from the United States. The only reasonable direction of policy for this purpose appears to be towards Japan, which is at present Taiwan's chief trading partner, accounting for roughly fifty per cent of Taiwan's trade by value in 1952, exclusive of MSA imports.

The present pattern of trade with Japan bears a close resemblance to that of the prewar period. In 1936, 92.5 per cent by value of Taiwan's exports went to Japan and much of the balance went to other Japanese dependencies. Imports from the Japanese Empire as a whole accounted for over 90 per cent of the total. Today the United States is next to Japan as Taiwan's chief trading partner. The importance of Japan, however, is increasing. In 1952, trade between Taiwan and Japan was restricted by agreement to no more than \$50 million in each direction. As of June 1953, the trade has been expanded to \$100 millions in each direction. The patterns of the trade may be expected to remain much as they were before the war: rice, sugar, pineapples, bananas, and other raw materials going to Japan in exchange for diversified manufactures. 2/

The fact that a large percentage of the "external economies" in Taiwan are of Japanese origin indicates a continuing market for Japanese goods. Many of the MSA-financed imports, especially those pertaining to the rehabilitation and maintenance of communications facilities and other equipment originally installed by the Japanese, already come from Japan, but the bulk of the MSA-financed imports consist of items which Japan cannot supply or can supply only in small quantities: raw cotton, soy beans, phosphate rock, fertilizers other than nitrates, wheat and wheat flour, petroleum products, and oils and fats, which account for 70 to 75 per cent of all MSA imports by value. It appears, therefore, that a complete return to the prewar trade patterns between Taiwan and Japan is not possible. An increased population, the objective of increasing self-sufficiency in such former major imports as cotton textiles, and new needs arising from the changed political position and altered population composition of the island -- all militate against such a return. Nevertheless, Japan is the only country in Asia which can satisfy a large percentage of Taiwan's imports requirements and at the same time purchase Taiwan's production for export. It also possesses greater know-how with regard to Formosan development than any other country and should be able to furnish valuable technical assistance, especially in agriculture. In this connection, however, the fact that JCRR is operating so effectively tends to reduce the necessity for Taiwan to have recourse to Japan's agricultural wisdom and techniques. 7

Both American and Japanese business men have indicated an interest in investing in Formosan development, as political and economic stabilization have gradually come about. As yet, however, there is no active program for encouraging such investment, although such a project is one of the objectives of the new Chinese Four-Year Plan. One encouraging sign, however, is the fact that procurement of MSA-financed commodities through regular commercial channels is now being encouraged, although the extent to which this will be successful is uncertain in light of a background of government-agency procurement. It is interesting to note in this connection that American capital invested in the Japanese economy in 1951 and 1952 is estimated at some \$310 millions, or about 15 per cent of the total American aid to the Japanese economy during the occupation. 3/ A similar percentage of private investment in Taiwan, based on the total American economic aid through fiscal year 1953 would amount to some \$43 millions. Although the two situations do not stand direct comparison, it is apparent that such a sum, even if invested largely in consumers goods industries, would provide an enormous stimulus for Taiwan's economy and might well offset the adverse effect on economic development caused by the MSA's deflection of funds to military purposes. 7

The Taiwan government also is concerned with inducing overseas Chinese to invest in Taiwan industry, but the response thus far has been slight. Premier Chen Cheng reported in an April 1953 address to the Legislative Yuan that such investment is one of the goals of the Four-Year plan, and that exchange regulations and tax restrictions are to be eased and modified as an inducement to investors. Nevertheless, he ended by mentioning the ever-present basic problem of domestic investment:

"A more important problem facing us is how to encourage savings of our people....It is hoped that our people will foster thrifty habits and realize the importance of savings and its relation to the capital needed by the government." 4/

A final assessment of Taiwan's situation indicates a continuing dependence on the outside world for assistance in the form of capital, technical aid, and deficient raw materials. Singularly enough, apart from the major calamity attendant upon the loss of China to the Communists, Taiwan has remained relatively isolated from the Asian scene and particularly the Korean war, at least in economic terms. There are few indications that Taiwan benefited directly from the war; there are others which indicate that the general increase in ocean freight rates, for example, may have acted to the detriment of the island economy. This isolation epitomizes Taiwan's economic position today: its world relations are almost entirely restricted to Japan and the United States, and to a lesser extent to China through Hongkong and the overseas Chinese in Malaya. It possesses to a very large degree a colonial economy similar to that which characterized it before the war. The bulk of Taiwan's capital goods must continue to come from abroad; technical aid also must continue to be imported, though perhaps at a declining rate, and the expensive services of international banking and shipping will have to be supplied by other nations. The possibility of a self-sufficient economy based upon foreign trade and the exchange of agricultural raw materials for manufactures exists, but is slim; there is no possibility of self-sufficiency except by a return to the subsistence conditions of 1946-7, a policy which for political reasons would be impossible today.

FOOTNOTES TO EPILOGUE

- 1/ See W. H. Fippin, "Farmers' Organizations in Taiwan," Chinese-American Economic Cooperation, January, 1953. Part II, pp. 59-66.
- 2/ One major difference between the present and prewar import trade with Japan is a substantial decline in the importance of textiles. Rapid expansion of the Formosan textile industry has brought about a sharp decrease in textile imports from Japan.
- 3/ See J. B. Cohen, "Private Point Four in Japan." Fortune, April, 1953.
- 4/ Quoted in Far Eastern Economic Review, June 18, 1953, p. 809.

APPENDIX

TABLE A

SELECTED AGRICULTURAL STATISTICS, TAIWAN^a

	1938	1947	1950	1951	1952
Area cultivated (hectares) +	859,000	833,952	870,632	873,870	881,450
Farm families +	424,500	553,308	638,062	661,125	685,000*
Rice hectareage + (cropped)	625,398	677,557	770,262	789,075	790,000*
Rice Production (000 m. tons) +	1,402	999	1,421	1,485	1,570*
Rice yields per hectare (kg.)	2,242	1,472	1,845	1,895	2,025*
Sweet potatoes hectareage (cropped) †	126,000	213,403	233,057	231,389	233,000*
Sweet potatoes Production + (000 m. tons)	1,726	1,783	2,201	2,022	2,090
Sugar cane hectareage	134,200*	29,905	121,940	79,249	---b
Sugar ** Production (000 m. tons)	967	31	612	351	520
Peanuts Production , (000 m. tons)	28	47	57	61	60
Wheat Production + (m. tons)	1,470	4,271	19,099	15,165	15,681
Tea Production (m. tons)	12,171	7,446	9,645	10,502	11,500*
Banana Production (000 m. tons)	202	124	117	100	140*
Pineapples Production (000 m. tons)	116	40	46	52	55*
Fish Caught (000 m. tons) +	90	62	84	104	122*
Swine (000 head) +	1,827	1,006	1,620	2,262	2,550*
All Cattle (000 head) +	325	298	381	394	395*
Mineral fertilizers consumed (000 m. tons)	466*	131	338	344	450*

TABLE A (continued)

	1938	1947	1950	1951	1952
Mineral fertilizers produced + (000 m. tons)	29*	17	59	115	154

a. Data are not in all cases directly comparable since they are derived from several sources.

b. Information not available.

* Approximate.

**Figures refer to years 1937-8, 1946-7, 1949-50, 1950-1, and 1951-2. In the calendar year 1951, sugar production is reported as 356,000 metric tons; in calendar year 1952, 624,000 tons. A production of over 800,000 tons is anticipated for the crop year 1952-3 due to exceptionally favorable climatic conditions, greater quantities of fertilizers, and the incentives offered by high fixed prices for sugar which are pegged to the price of rice by the Taiwan Sugar Corporation.

CHIEF SOURCES: Taiwan Agricultural Yearbooks, the MSA-published Chinese-American Economic Cooperation, and the MSA-published Taiwan Economic Fact Books.

TABLE B
SELECTED INDUSTRIAL STATISTICS, TAIWAN^a

	1938	1947	1950	1951	1952
Power-installed + Capacity (kw)	190,000	275,000	276,000	304,000	331,000
Power-production + (000,000 kwh)	696	577	1,044	1,292	1,382
Cotton textile spindles +	---b	---	46,000*	84,560	129,976
Cotton cloth Production + (000 yards)	---b	6,001	39,730	56,600	89,293
Cement Production + (000 m. tons)	149	193	332	389	446
Salt Production + (000 m. tons)	275c	165	178	284	333
Coal Production + (000 m. tons)	2,199	1,308	1,404	1,658	2,286
Timber Production + (000 cu. meters)	327	147	327	368,000	451,000
Aluminum ingots Production (m. tons)	4,619	---	1,764	2,984	3,856
Camphor Production (m. tons)	2,551d	481	684	913	331
Canned pineapple Production (000 cans)	59,082	6,371	6,974	12,425	15,000*
Railway freight + (000,000 ton kilometers)	833	505	867	925	1,139

--- a- Data are not in all cases directly comparable since they are derived from several sources.

b- Quantities inconsequential.

c- 1939

d- May include double-counting of BB and refined camphor. If so, quantity should read 1,916.

* Approximate.

CHIEF SOURCES: Chinese-American Economic Cooperation, Bank of China Monthly Economic Review, and United Nations publications.

TABLE C
TAIWAN: VOLUME OF MAJOR EXPORTS ^a

Export	Unit	1937	1950	1951	1952
1. Sugar	m. tons	1,111,000	608,425	283,515	458,182
2. Rice	"	688,027	27,300	84,935	107,415
3. Bananas	"	156,781	10,800	26,502	42,567
4. Tea	"	10,282	7,549	11,324	9,323
5. Salt	"	117,222	203,210	239,051	181,412
6. Coal	"	407,915	67,705	18,121	77,829
7. Pineapples (canned)	"	35,000 *	3,539	4,870	5,016
8. Cement	"	9,715	3,554	50,500	11,144
9. Camphor	"	2,026	1,477	929	277
10. Hats, straw	Pcs.	5,475,000	--- ^b	530,320	838,053

a-Data are not in all cases comparable since they are derived from several sources.

b-No information available.

* Estimate.

CHIEF SOURCES: Official Chinese statistics as reported in Chinese-American Economic Cooperation and other MSA sources, and the Civil Affairs Handbook: Taiwan.

TABLE D
TAIWAN TRADE, 1952^a

EXPORTS	VALUE(000)	%	IMPORTS ^b	VALUE(000)	%
Sugar	US\$69,683	58.29	Chemical Fertilizer	US\$12,772	11.08
Rice	23,240	19.45	Beans	8,945	7.77
Tea	5,745	4.80	Bean Cakes	285	0.25
Salt	2,539	2.13	Wheat Flour	7,861	6.83
Citronella	2,448	2.05	Wheat Bran	279	0.25
Banana	6,633	5.55	Peanut Oil	772	0.68
Coal	160	0.13	Milk & Products	1,967	1.07
Canned Pineapple	2,012	1.68	Salted Fish	3,505	3.05
Cement	280	0.23	Cigarettes & Tobacco	815	0.70
Camphor	322	0.26	Raw Cotton	1,841	1.60
Paper Pulp	103	0.11	Cotton Yarn	2,273	1.98
Chemicals	165	0.14	Cotton Pcs. Goods	3,965	3.44
Metals	682	0.57	Cotton Products	980	0.86
Feathers	1,563	1.31	Wool & Products	2,562	2.23
Hat Bodies	585	0.49	Hide & Leather	1,181	1.03
Others	3,359	2.81	Gunny & Bags & Jute	2,580	2.23
	119,527	100.00%	Logs & Lumber	829	0.73
			Ores, Metals etc.	11,524	10.00
			Machinery & Tools	9,414	8.18
			Electrical Material	1,470	1.28
			Bicycles & Parts	1,176	1.03
			Vehicles, Vessels, etc.	3,810	3.30
			Chemicals	1,407	1.22
			Pharmaceuticals	6,822	5.92
			Chinese Medicine	2,189	1.88
			Dyes & Paints	1,744	1.52
			Glass & Products	677	0.57
			Paper & Pulp	2,278	1.97
			Oil & Wax	2,766	2.40
			Crude & Fuel Oil	592	0.50
			Rubber & Products	3,451	.99
			Others	12,476	10.82
				115,225	100.00%

CHIEF SOURCES: Official Chinese government sources as reported by MSA.

^a Source: Bank of China, Monthly Economic Review, No. 29, Taipei, Feb. 1953. pp. 5-6.

(Courtesy Dr. Willert Rhynsburger)

^b Exclusive of MSA-financed imports for which see Table E below.

TABLE E

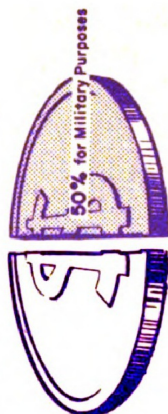
TAIWAN IMPORTS, 1952 (MSA-FINANCED)

<u>KINDS</u>	<u>VALUE (000)</u>
Chemical Fertilizer	US\$22,768
Soya Beans & Oil	7,654
Wheat Flour	5,503
Salted Fish	337
Cotton Raw	11,352
Cotton Yarn	4,872
Cotton Piece Goods	1,276
Hides & Leather	593
Logs & Lumber	495
Ores, Metals & Manufactures	4,672
Machinery & Tools	1,946
Electrical Materials	3,778
Vehicles & Parts	579
Chemicals	765
Pharmaceuticals	1,432
Rubber & Products	380
Paper & Pulp	598
Oil and Wax	1,213
Crude Oil	2,826
Others	434
Total	<u>73,485</u>

CHIEF SOURCES: MSA publications.

Military costs absorb half of all expenditures of the National and Provincial Governments.

1952 CONSOLIDATED BUDGET



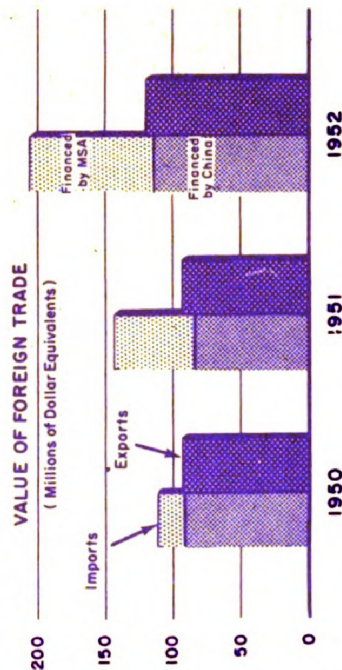
\$ 260 MILLION *
(In Dollar Equivalents)

* Converted at the official rate of one U.S. dollar = 10.3 New Taiwan dollars.

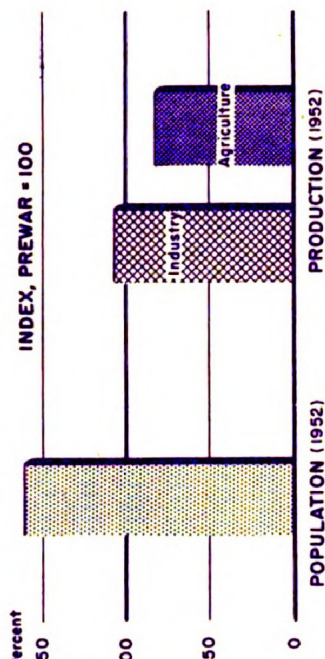
FINANCING THE MILITARY BUDGET

OVERCOMING THE TRADE DEFICIT

Export earnings do not cover import requirements. As Chinese reserves were drawn down, increased reliance had to be placed on outside aid.



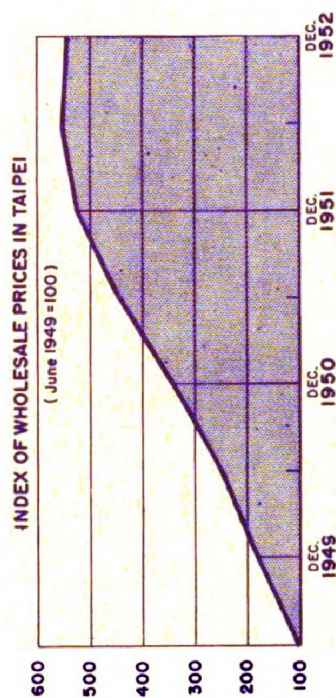
Production has not kept pace with population gains, with the result that surpluses for export have decreased.



RAISING PRODUCTION LEVELS

COMBATING INFLATIONARY PRESSURES

From mid-1949 to the end of 1951, wholesale prices rose over 400 percent. This rise was virtually halted in 1952, however, when prices rose less than 4 percent as compared with 52 percent in 1951.



Source:

DIVISION OF STATISTICS & REPORTS
MUTUAL SECURITY AGENCY
FEBRUARY 12, 1953

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